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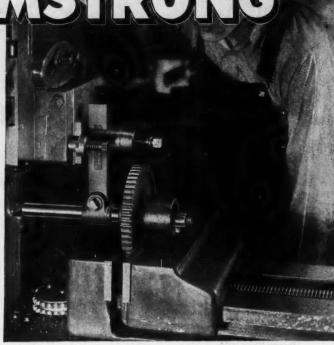
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July,

Machine Shop

JULY, 1943

Vol. 16, No. 2

CINCINNATI, OHIO

We Present ---

- —as the feature article in this month's issue—a discussion on the construction of Gyro indicators—non-magnetic instruments which help our pilots to fly through fog or darkness. This article describes and illustrates some of the more interesting operations involved in the building of these very important instruments.
- on page 134—"Building Morale at Carnegie-Illinois Steel," an interesting and timely story written by Lyne S. Metcalfe which points out that a high level of morale is a valuable asset to any organization and discusses the use of sound-slide films in the plant of the Carnegie-Illinois Steel Company to obtain this "priceless ingredient."
- on page 146—Noel Brindle's fifth article in the series "Tooling for the Automatic Screw Machine." This article is devoted to internal cutting operations, including centering, drilling, reaming, and counterboring. Recommended methods for producing typical screw machine parts in which the applications of these operations is involved are analyzed.
- on page 164 our usual "Ideas from Readers" section in which are described and illustrated several handy tools and gadgets for the man in the shop.
- on page 184 an illustrated section devoted to a discussion of the use of various pieces of recently developed equipment in the production of such items as Bogie wheel tire bases, gun parts, marine reduction gears, and tractor sprockets, under the heading "Modern Equipment at Work."
 - on page 208 illustrations and descriptions of new shop equipment and materials.



Fig. 1—Assembling Gyro Horizon and Directional Instruments for U. S. Army Airplanes. So Delicate are these Instruments that an Invisible Speck of Foreign Matter will Throw Them out of Control.

The Construction of Gyro Indicators

This article describes some of the more interesting operations in the building of the Gyro Instruments which help our pilots to fly through fog or darkness

> By HOWARD CAMPBELL Editor, MODERN MACHINE SHOP

THE accurate steering of an airplane requires a fixed directional reference such as a star, the sun, or ground objects with which the direction of the plane may be compared. When outside visibility is obscured by fog or darkness—generally referred to as "Blind Flying"—the Directional Gyro Indicator provides the only fixed

directional reference within the cockpit of the airplane.

The Directional Gyro Indicator is non-magnetic and is in no sense a compass; thus for that reason the magnetic compass, in spite of its limitations, must be retained. The magnetic compass alone, however, will not serve as a direction indicator in

Fig. 2—Brass Gyro Wheel Set Up on Milling Machine Table to Have 24 Pockets Milled in the Periphery at a 40-Degree Angle. The Piece Shown has been Completed. The Entire Operation is Automatic.

-

blind flight, because the pitch and roll of the airplane sets up an oscillation and swing of the magnetic needle to such an extent that the true heading is only a rough guess. During this period of rough flight, the cylindrical dial of the Directional Gyro Indicator will accurately hold to a fixed head without the least swing or oscillation.

The maintenance of the fixed head is due to the fact that the inside mechanism which supports the dial is a gyroscope, and the phenomena of gyroscopic inertia holds the cylindrical dial on a fixed directional heading. During prolonged flight and when the airplane is flying straight and level, however, the Directional Gyro Indicator is occasionally checked with the



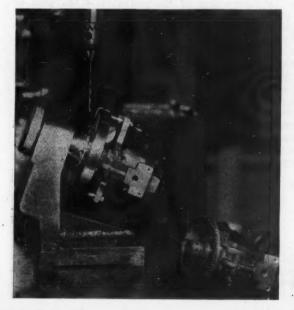
magnetic compass.

Up to the beginning of the present war, most of the gyro instruments for airplanes were built by the Sperry Gyroscope Company, Brooklyn, New York, but due to the greatly increased need for such instruments the Ternstedt Division of Fisher Body, General Motors Corporation, Detroit, Michigan, has begun production of

these instruments. The pictures shown in this article were taken in the Ternstedt Manufacturing

Division plant.

This story will comprise practically a trip through the gyro indicator section of Ternstedt. Beginning with the illustration Fig. 1, we see a long double row of work benches with a conveyor belt running lengthwise between the benches. A shelf built



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Fig. 3—Set-Up for Drilling Series of Angle Holes in the Hub of the Vertical Outer Ring for a Gyro Instrument. The Drill is 0.0937 Inch Diameter and there are Eight Holes, Evenly Spaced

n



Fig. 4—At Left an Inspector is Using a J & I Comparator to Check the 40-Degree Angle on a Gyro Wheel Shaft. The Bench Comparator is Ideal for this Work. At Right a Sheffield Gage is Being Used to Check the Thickness of a Lower Bearing Ball Race



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periphery of the wheel at a 40 deg. angle. The piece shown has been completed so that the pockets can be seen. The vertical spindle which carries the workpiece is geared to the machine spindle so that it will feed into the cutter automatically, then stop and back away, then index automatically so that the entire operation is automatic. The horizontal dimension of the pocket is 0.765 plus or minus 0.002 inches, and the pockets

spectors at the far end of the room. Women are particularly well adapted to the delicate task of building gyro Horizon and Directional Indicators for Army planes, due to their facility in handling small parts. So delicate are these instruments that an invisible speck of foreign matter will make them inaccurate or throw them out of control. To help to ensure accuracy, all assembling and inspection operations are carried on in air-conditioned rooms, and all workers must wear lint-free clothing such as the smocks worn by these girls. To aid in obtaining the necessary accuracy, especially on inspection operations, the rooms are maintained at an even temperature.

above the belt provides additional

working space. The women shown in

this picture are assembling gyro in-

struments, each completed instrument

being placed on the slow moving con-

veyor belt, which carries it on to in-

The illustration Fig. 2 shows a



Fig. 5—Using an Edlund Drill, Equipped with an Etta Tapper, to Tap Nine Cover Holes in the Face of a Die Cast Directional Instrument Case. The Taps Operate at a Speed of 176 R.P.M.



Fig. 6—This Girl Inspector is Using a Spencer Binocular Miscroscope to Inspect the Workmanship on Small Ball Bearings. Any Speck of Rust or Immovable D u st is Cause for Rejecting the Bearing. In the Background a Small "Peerless" Washing Machine is in use for Cleaning Small Parts



are cut with a ½-inch diameter cutter. This job is done on a U S Multi-Miller.

The setup shown in Fig. 3 includes the tools necessary to drill a series of angle holes in the hub of the vertical

outer ring for one of the gyro instruments. There are 8 of these holes, drilled at even distances apart, with a 0.0937 inch drill. The allowance on the hole diameter is plus 0.0023, minus 0.0017 inch. These holes, which are drilled at a 20 deg. angle, are the air vents to allow the escape of the air by which the instrument is operated. The machine is an Avey Single Drill.

There isn't a great deal to be seen in Fig. 4 excepting that this illustration shows some of the fine instruments which are used for checking the accuracy of the gyro instrument parts. At the left in the illustration a girl inspector is using a J & L Comparator to inspect the 40 deg. angle on a gyro wheel shaft. The comparator greatly enlarges the workplece so that, by means of previously drawn lines on the ground glass in the comparator, any varia-



tion from a true angle will immediately be apparent. With this instrument lateral measurements can be made to within 0.0001 inch.

The inspector at the right is using a Sheffield gage to check the thickness of a lower bearing ball race. This ball race is 0.127 inch thick, with a tolerance of plus 0.001 minus 0.

The operator shown in Fig. 5 is using an Edlund drill, equipped with an Ettco tapper, to tap 9 cover holes in the face of a die cast directional instrument case. The holes are 0.640 inch diameter and 8 of them are tapped through while one is a blind hole. Using this equipment, with an ample flood of cutting oil, the taps feed into the holes at a speed of 176 r.p.m.

The girl inspector shown in the foreground of Fig. 6 is using a Spencer binocular microscope to inspect the workmanship on small ball bearings. It is obvious that ball bear-



Fig. 7—Testing a Horizon Instrument Pendulum While the Pendulum Shaft is Suspended in a Blast of Air, the Rotor is Revolved at a Speed of 15,000 R.P.M., Giving the Inspector an Opportunity to Determine Whether or Not It is Working Properly



cleaning and rinsing solution and a drier. The load of new parts to be washed is lowered into the first jaw. containing the cleaning solution, there the basket is rotated to the right for five seconds, then to the left, reversing at five-second intervals until the parts are cleanusually one to two

minutes. Then the basket is operated at high speed for about one-half minute in each of the rinsing solutions, finishing by lowering the basket into the drier and drying by means of an electric heater. The heater shuts off automatically when the parts are dry.

The operator shown in Fig. 7 is testing and adjusting a horizon instrument pendulum, using for this purpose a machine which was especially designed for the job. The horizon instrument pendulum is swung between cones at either end of the machine. The pendulum shaft is tapered to a point at each end, and the cone has a tapered hole in the center into which the tapered end of the pendulum shaft fits. However, in fitting the pendulum shaft into the cones, a little play is left; thus when the air is turned on, feeding up and

ings for such delicate instruments must necessarily be finely finished and accurate in every detail; thus this high-powered microscope is used to discover any imperfections that may exist. The small brush is used to brush away any dirt that may show up on the surface of the bearing. Any slight speck of rust or immovable dust is sufficient cause for rejecting the bearing.

In the background of Fig. 6 can be seen a small automatic washing machine, known as a "Peerless" washer, which was designed for the cleansing of such small parts as those used in these directional instruments. The small pieces are put into a small "basket" suspended from a vertical shaft which is operated direct from a motor with rheostat control. Spaced around the machine are four jars of

Fig. 8—With the Aid of This Scale the Operator Selects Four Springs of Equal Tension and Proper Strength for Use in Bearing Housings



through the hole through the axis of the cone, the effect is to center the shaft in the blast of air so that the pendulum is actually suspended on air at 10 to 13 lb. per square inch pressure.

With the pendulum shaft thus suspended by the air blast, the rotor is revolved at a





speed of 15,000 r.p.m. while the operator determines whether the pendulum is



Fig. 9—This Compli-cated-Looking Outfit is a High Speed Bal-ancing Machine, Used Here to Find a Possi-ble Unbalance in a Directional Instrument Rotor. By Means of an Air Blast the Rotor is Revolved at a Speed of 9,000 R.P.M., at Which Speed any Out-of-Balance Condition is Reflected on the Indicator of the Amplifying Instru-ment, Together with the Amount of

Unbalance



Fig. 10—Testing the Performance of Rotors, Which is Done by Speeding the Rotor to 10,000 to 12,000 R.P.M. by Means of an Air Jet, then Using a Screw Driver as an Amplifying Instrument to Check the "Hum" of the Bearings

working in a satisfactory manner.

The tension of the bearing housing springs is tested by the aid of a small scale and indicator shown in use in Fig. 8. There are 4 springs used in a rotor bearing housing assembly in a directional instrument to compensate for changes in temperature. The inspector's task is to select the 4 springs which will be practically equal in their tension and which all have sufficient strength so that 130 ounces of pressure is required to deflect a spring as much as 0.001 inch. The scale can be set to produce the desired pressure, and the indicator gives the amount of deflection at a given pressure.

The operator shown in Fig. 9 is engaged in balancing a rotor for a directional instrument to make sure that the rotor is perfectly balanced. The machine is too complicated to describe it in full in this paragraph; sufficient to say that the rotor is spun by means of an air blast to a speed

of 9,000 r.p.m., at which speed any out-of-balance condition is reflected on the indicator of the amplifying instrument. The instrument is so connected electrically with the shaft upon which the rotor spins that the exact point of unbalance is indicated and can be identified when the machine is stopped. After finding the point and amount of unbalance, the operator removes the rotor from the balancing machine, swings around to the left, and drills a small hole of the correct diameter and to the correct depth to remove a sufficient amount of stock to correct the unbalanced condition. The whole operation is performed in less time than it takes to describe it, but when the rotor has emerged from this operation it is in perfect balance and can be depended upon to behave as it should in service.

The inspectors shown in Fig. 10 are testing the performance of rotors by air. The rotor is put into a small

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hand instrument by which it is connected temporarily with the nozzle of an air outlet so that an air blast can be used to speed the rotor up to speed of 10,000 to 12,000 r.p.m. The "holder" in which the rotor is rotating is then removed from the air blast and turned by hand into all sorts of positions so that the operator can note the behavior and performance of the rotor.

If it seems to run smoothly in all positions, the operator at the left passes it on to the operator on the right, who speeds it up again, and while it is operating at this terrific speed, checks the speed of the opposite bearings. This is done by holding one end of a screw driver against one of the bearing housings with the other end of the screw driver against the operator's ear: from long experience she can tell by the pitch of the hum of the revolving rotor whether or not it is running as smoothly as it should. Then by checking the sound of the shaft running in the bearing on one side of the rotor against the sound of the bearing on the other

side, she can determine whether the bearings are comparable in their performance.

The inspectors shown in Fig. 11 are testing horizon instruments for accuracy under conditions which are intended to simulate flying conditions. The instrument is attached to a bracket by which it can be tipped in either direction while running, thus giving the inspector an opportunity to observe whether the instrument is recording the angle of operation correctly. By tipping the instrument before slipping it into place in the bracket, the inspector can instantly throw the indicating line off from the horizontal; it is then supposed to take from 2 to 4 minutes for it to work back to horizontal. If it doesn't resume the horizontal within the specified time, the instrument is checked for defects.

The equipment shown in Fig. 12 was devised to give the flying instruments a test which is intended to simulate the "roll, pitch and yaw" of a plane under actual flying conditions. This is known as the Scorsby test.

Fig. 11—These Inspectors are Testing Horizon Instruments for Accuracy Under Conditions which are Supposed to be Practically Identical with Flying Conditions





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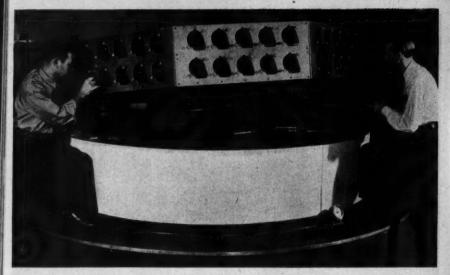


Fig. 12—The Scoreby Test. With the Instruments in Place on the Machine, the Head Slowly Revolves while "Pitching" and "Yawing." The Machine Simulates the Movement of a Plane in Flight Accurately Enough so that the Accuracy of the Instruments can be Determined

With the instruments in place on the testing machine, the head holding the instruments slowly revolves while at the same time pitching and "yawing." Of course, it cannot go so far as to imitate the movement of a plane with the wings practically in a vertical position or in a roll or dive, but the machine simulates the movement of a plane in flight accurately enough so that the accuracy of the instruments can be determined.

Each instrument is tested on this machine for 10 minutes. If any defects show up, the instrument is adjusted and then run for another 10 minutes. When it has run 10 minutes accurately, it is checked by the Air

Corps inspector, who must approve it before it can be shipped for use in a fighting plane. Note that the instruments in the center panel are directional indicators while those on the left side are horizon instruments.

After passing the Scorsby test, the instruments are given tests under extreme cold and heat. The Gyro Horizon instrument is put into the "wobble box" shown in Figure 13, where four of these instruments at a time are given an individual 7½ degree angle roll, pitch and yaw test under conditions of 31 deg. minus Fahr. In all, the instrument is probably tested for some thirty minutes, the temperature being varied during these thirty

Featured in next month's issue will be a story by Gerald Eldridge Stedman on the "Fabrication of the 90 MM Gun" in the plant of The Wheland Company, Chattanooga, Tennessee. Watch for it.



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Fig. 13—The "Wobble Box." Four Instruments at a Time are Given a Test Which Includes a 71/2-Degree Angle Roll, Pitch and Yaw Test at 31 De Below Zero grees Below Zero. The Instrument Must Function Perfectly in this Intense Cold



ment is given the wobble box test simultaneously with the cold test. The directional gyro instruments are placed in a stationary ice box where the temperature is 31 deg. below zero.

Immediately after the cold tests, both instruments are placed in an oven in which the temperature is 128 deg. Fahr. If they work perfectly after being removed from the extreme cold to the extreme heat they are okehed by the inspector.

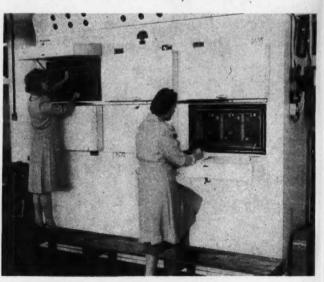
minutes so that it is actually under test at 31 deg. Fahr. below zero for approximately five minutes. The instrument must function accurately in this intense cold while the box wobbles in positions intended to simulate a plane in flight. The face of one in-

strument, which has just been placed in the box, is still visible while the intense cold has frosted the glass in front of the other three instruments.

Only the Gyro Horizon instru-



Fig. 14 — Immediately after the Cold Test in the Wobble Box, the Instruments are Given a Working Test in This Oven at a Temperature of 128 Deg. F. If They Operate Perfectly After Being Removed from the Extreme Cold to Extreme Heat, They are OK'd for Duty



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UPPER RIGHT. Broaching the diagonal slot in this brass fuse part is typical of the production-with-precision work required. Using an American 16" Rotary Machine, with 8-station fixture designed for manual loading, automatic clamping and automatic discharge, extremely high output is obtained. LOWER LEFT. American broaching engineers designed this fixture to locate and index the part from three holes, with further support by recessing part in toughened steel block to minimize burr. American's complete broaching service—machines, tools, and engineering—contributes mightily to winning war production, profitable post-war production.

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Instruction in the fine art of ''handling'' workers is imparted to the foremen and supervisors of the Carnegie-Illinois Steel Company by means of sound-slide films.

Building Morale at Carnegie - Illinois Steel

A good organization manager is necessarily a good psychologist—and a good psychologist knows that a high level of morale is a valuable asset to any organization.

By LYNE S. METCALFE

SOMEONE has said that "there is no substitute for enthusiasm," and inasmuch as enthusiasm is practically a synonym for a high level of morale, it might as well be said that there is no substitute for morale. Like a good name, morale is the "priceless ingredient." The morale of the organization is reflected in the management - employee relations, in the production records, and in the quality of the product. Morale is

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priceless, yet cannot be purchased.

Morale is intangible in its form, but tangible in its results. It cannot be forced, and will not grow and thrive in the wrong atmosphere. The seeds of morale must be planted in the rich soil of mutual trust and understanding between the employees and the company, and nurtured by respect for the product and loyalty to the organization.

Morale is particularly

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important right at this time when our nation is engaged in a struggle for its life and liberty. Like most other enterprises in war-time, the machine shop necessarily faces the problem of making the most efficient use of available man power. After all, people man and operate the machines, and people direct the labor of those who operate them. Therefore, ability to "handle" personnel to the best advantage and in the most efficient manner goes a long way in making every man-hour count in the war production effort.

These factors are basic in handling war-time machine shop workers. They have little to do with machines or raw materials or finished products; they are concerned with people, and with that which in the nature of human beings makes of them fully efficient and willing workers—or otherwise.

In fact, they represent what we know as *morale*, and morale among the Nation's workers is going to go



a long way toward helping to win the victory.

The war situation has created a multiple production problem; millions of workers are being taken into our Armed Forces at a time when our production must be doubled and tripled. Men and women who have had no previous experience with the tools of industry are being brought into the shops to operate production machines, to assemble parts and units, to inspect, and to test. To the vast majority of these people the practical aspects of machining and assembling are still new. They must be trained for their jobs, and trained with all possible speed.

It is important that the new worker be made to "feel at home" on the job. He must be impressed with the fact that everyone around him is ready to help him. He must be inspired with self confidence and with a desire to give to the job the best that is in him. Then, too, he must be made



to realize that merit and achievement do not go unnoticed, but frequently are rewarded with advancement. Above all, he must be trained at the outset to "think safely" at all times.

But before the foreman or supervisor can be depended upon to handle these workers in accordance with the principles outlined above, he himself must be trained.

Fully recognizing these facts, the Carnegie-Illinois Steel Company, with 130,000 employees, has developed a simple program of building and maintaining morale through special training of its supervisory staff. For all practical purposes, the company might as well have been in any other

line of business, so closely has the program adhered to the principles of human conduct and attitude involved.

The system was devised and prepared by the personnel training department of the company for its own private use. So successful did it prove in raising and maintaining a high level of morale among the supervisors and foremen, however, that as a contribution to the war production effort generally the company decided to make the principles of

the system available to any employer who might be interested, regardless of the line of business in which he might be engaged.

The system is of the visual type. The company has prepared and produced a series of five sound-slide films, each of which deals with a single phase of foremanship. The slide films are based upon company policies in employee relations, and are intended to convey the principles of these policies in a simple and easy-to-understand manner to the foremen gathered in group meetings.

The purpose is to provide the executives with a dramatic and verbal formula or "pictured pattern" with which



FILE-FLINGIN FREDDIE-WHEN HE CAME OFF TH' ASSEMBLY LINE TH' STORK FORGOT HIS BRAINS!

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MASSACRE 'M!

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to handle unusual situations that may arise in the shop and which will help these executives to handle workers, old and new, with human understanding. This is especially desirable in the case of the worker who is new on the job.

Each of the sound-slide films covers one phase of this responsibility. The characters presented on the screen are the types of foremen and supervisors found in the average shop. While the business of the Carnegie-Illinois Steel Company is the production of steel, the steel business plays a minor part in the situation.

On the disc records—one for each filmstrip - the suggested conversation between the foreman and worker in a given situation is repeated by professional voices. Thus the machine shop boss is given a "pattern" to follow in the language that he and his workers commonly use in every-day contacts, and in truly human style.

There is no "preaching" in these releases: everything is suggested to the foreman or department head.

Each film and record has a running time of approximately 15 minutes, and each is the basis for a single group meeting. It is customary for the conference leader to speak briefly of the subject before the presentation, throwing the meeting open for discussion after the showing.

Basically, these are the objectives sought by the Carnegie-Illinois Company through this program:

1. The foreman, himself, should realize the importance of developing qualified understudies, because he is in the line of promotion or advancement.

2. He should shoulder a substantial part of responsibility for the success of the shop safety program, because of his constant contact with the workers. This point is especially important in the case of the inexperienced worker.



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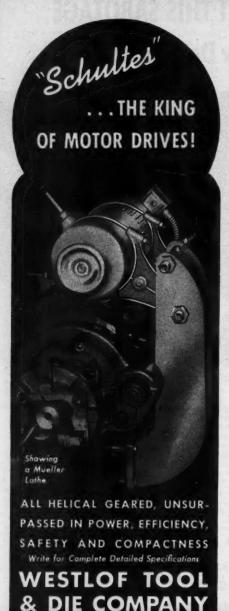
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He should know as much as possible about "handling" men, and about his obligations to those who work under his direction.

4. He should be taught to listen to the ideas, suggestions, and complaints of the workers and to see that these suggestions or complaints receive proper consideration.

5. In war time, especially, he has an obligation to make the new worker feel at home on his job, and to develop in the new worker a sense of pride in

his work.

All of these objectives are, of course, basic in good supervision in any workshop or factory. They are as desirable in the machine shop as in the steel mill. They make for smoother operation and a higher production rate. Each subject is presented objectively, and represents a successful corporation's experience and policies along these lines. The program is free from all preaching or rule-making. The lectures are much more effective as presentations of conduct "patterns" in slide-film form than they would have been as direct lectures.

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Those who attend the meetings at Pittsburgh and other Illinois-Carnegie plants do so by invitation only. Attendance is not compulsory, but the records show an attendance of almost 100 per cent.

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Tooling for the Automatic Screw Machine, V

This article is devoted to internal cutting operations, including centering, drilling, reaming, and counterboring. Recommended methods for producing typical screw machine parts in which the application of these operations is involved are analyzed.

By NOEL BRINDLE

THE illustration Fig. 22 presents a part to be made from hard brass rod, the design of which includes a turned diameter and a reamed hole that extends the full length of the piece. Inasmuch as hard brass rod is usually machined at the maximum available spindle speed, a high speed machine should be used. Thus a Brown & Sharpe No. 00G High Speed Automatic is specified because the capacity of this machine is well suited for the making of the part under discussion. This point may be confirmed by referring to page 258 of the B & S Treatise.

In considering the chuck sketch, thought should be given to the advisability of positioning the part as shown in the drawing Fig. 22. The 0.250 plus or minus 0.002 inch diameter can then be formed during the drilling operation, thus eliminating the time required to turn the ¼-inch diameter plus one indexing.

In deciding the order of operations by which the piece can be produced in the minimum time, it should be noted, upon referring to Fig. 22, that the first cutting operation requires the use of a centering tool—which should

always precede a drilling operation when the size of the hole to be drilled is less than ¼ inch in diameter. The centering tool is a short drill, of larger diameter than that of the drill to be used for the hole. In some cases the point of the centering tool is thinned and this, together with the lack of opportunity for the tool to "run out," makes it an ideal tool for use in starting a hole in the rod for the drill to follow on the center line of the spindle. When this centering operation is omitted, the drill will tend to "run out" and the rear end of the hole will be noticeably off-center if the hole is at all deep.

The drilling of the hole should be followed by the reaming operation. Reaming affords two advantages; the necessary accuracy, and a really smooth hole.

In considering the possibility of overlapping the cross slide and turret slide operations, it will be noted that the forming operation takes place while the hole is being drilled. It is also advantageous to overlap part of the cutting-off operation. The chuck sketch shows that the cut-off tool can advance to the 0.250 inch formed di-

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The throw for the centering operation is determined by allowing 0.010 inch for each 1/32 inch of drill diameter. The hole is 1/8 inch, or 4/32 inch diameter; therefore, 0.040 inch will be the dimension of the throw, plus 0.010 inch for the approach. drill throw will equal 0.010 inch to approach the work, plus the length of the part, plus the width of the cut-off tool. The throw for the reaming operation is similar to the drilling throw, with the exception that the front end of the reamer passes the end of the part by 0.040 inch.

The amount of throw for cutting off a part into a drilled hole is determined as follows: A distance of 0.005 inch is allowed for the approach, plus the wall thickness of the part (% minus % divided by 2) plus the depth of the angle

on the cut-off tools, plus 1/32 inch for the heel to pass the edge of the hole. This 1/32 inch is added to compensate for the wear on the lip of the drill and the heel of the cut-off tool.

The amount of throw required for cutting off the part after the reaming operation has been completed should be determined by starting with the 1/32 inch for the heel of the cut-off tool to pass the edge of the hole, plus the depth of the angle on the cut-off tool, plus the wall thickness remaining after the reaming operation has been completed. This wall thickness equals 0.250 inch minus the diameter of the hole, divided by 2.

The feeds for the various cutting operations will be found on page 248 of the B & S Treatise. The number of cutting revolutions required is determined by dividing the feed per revolution into the number of throws.

Fig. 22 1/8 -.250 - .002 1/8 Ream & S #00G H.S. (36 Sp) A.S.M. 6000 R.P.M. Order of Operations Throw Feed Revs. Feed to Swing Stock 29 Clear Center DW. .050.005 Double I.T. 29 52 Drill .465 .009 Double I.T. 29 Ream 48 Cut Off from 1/4 in. diameter .128 .0035272 (A) Operations Overlapped or Partially Overlapped Form DW. Cut Off DW. .077 .002 .0035.195Refer to the B & S book, page 273. In the 6000 R.P.M. Column, the nearest number of revolutions to 272 is 275. Under the column, "Time in seconds to make one part," 2%

> The revolutions required for indexing the turret and feeding the stock are given on page 273 of the Treatise under the column headed 6,000 R.P.M. Four extra revolutions are added to the 25 shown in the Treatise to aid the operator in setting up the ma-

seconds are shown.

Two "double indexings" are shown in Fig. 22. It is a distinct advantage to index two stations of the turret instead of one for the making of this part. This is conveniently accomplished by making a standardized adjustment inside the turret, as described on page 21 in the B & S Treatise. Single or double indexing is performed in the same amount of time. Single indexing of the turret for this case would require more revolutions to make the part. Otherwise, the number of revolutions from the end of the reaming operation to the clearance time would need to be sufficient to allow four indexings of the turret. By using the double-indexing mechanism, only one indexing will be required during the cutting-off operation.

Two types of cutting tools may be used for the centering operation. A short twist drill of a larger diameter than the hole is usually preferred. A straight two-lipped drill with a narrow web thickness is sometimes used for centering brass and aluminum parts but is not considered suitable for machining tough materials, such as mild and tool steels.

Twist drills are available that are designed especially for machining brass rod. The flutes have a slow twist and are polished. These two features help to prevent the chips from clogging in the hole.

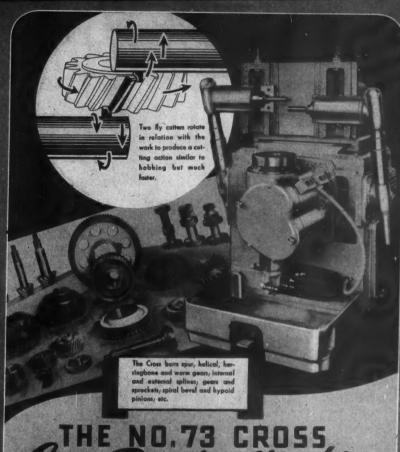
A Stub Screw Machine Reamer is recommended for the reaming operation. This reamer has spiral flutes and can be obtained in a variety of required diameters.

The centering tool and the twist drill should preferably be held in a Floating Holder to enable the operator to locate the centering and twist drill "on center" before the two bolts on the holder are tightened. In less precise work, occasionally another type of holder is used, such as the B & S Plain Drill Holder. No adjustment is provided in this type of holder, however, and when deep holes are to be drilled, or a very small drill is being used, it is advisable to use a floating holder.

Floating holders are generally preferred for holding reamers. When using the B & S type floating holder, the reamer is floated into the hole to centralize it and then the bolts are tightened. The Pratt & Whitney-type reamer holder allows the reamer to float while the hole is being reamed and an adjustment is provided to obtain the required amount of float.



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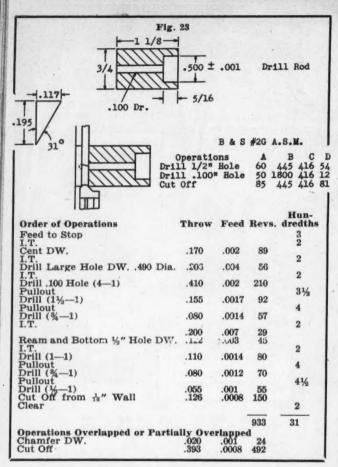


Figure 23 shows a 0.500 ± 0.001 inch counterbored hole and a 0.100 inch diameter hole which is 47/64 inch deep.

Assuming that both the 30 and 36 spindle speed automatic screw machines are available, as well as the "regular" machines, it would be advisable to specify a "regular" machine for this job because the material to be machined is tool steel drill rod. The surface speed required for machining this material will determine the spindle speed to be used

and the spindle speeds available on the "regular" machine are usually adequate for making steel parts.

A B & S No. 2G
"regular" machine should be
used because the
capacity of this
machine suffices
for 1-inch round
stock, turning capacity of 3 inches
and a feeding
stock capacity of
4 inches. This is
shown on page
256 of the treatise.

The recommended surface
speeds for the
drilling, counterboring, and cutting-off operations
are shown in Fig.
23 in column "A."
In column "B" the
resultant spindle
speeds for the
above operations
are shown, based
on the various
diameters. The

spindle speeds shown in the third column—"C"—are taken from page 236 of the treatise and indicate spindle speeds which are nearest the slowest speed shown in column "B." The last column shows the actual surface speeds for the various operations based on the spindle speed to be used.

The cutting off operation should be performed with a general-use circular tool, or a cutting-off blade, as shown in the chuck sketch. The circular chamfering tool will also be of general use construction. All the end cut-

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ting tools should be held in floating type holders, such as B & S.

In the order of operations, the ½-inch hole is drilled before the 0.100-inch hole. This sequence decreases the time by seconds, since the small drill starts where the larger drill ends its cut. This obviates drilling the full length of the part with the small drill.

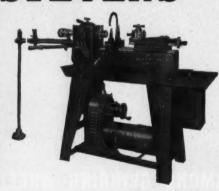
Four drill "pull-outs" are used in drilling the 0.100-inch hole. It has been found advisable in automatic screw machine work to drill to a certain depth, then allow time for the drill to recede until the tip has passed beyond the end of the part by approximately ½ inch. There are two reasons for this procedure; first, to allow the oil to wash off the chips, and second, to afford the point of the drill time to cool before drilling again.

Definite ratios of drill diameter to depth of hole have been developed for drilling deep holes. The recommended "ratio to drill diameter" for the various drilling operations are shown in Fig. 23 adjacent to each depth of drilling.

The 0.100-inch hole is partially drilled, then the reaming and bottoming of the 1/2-inch hole is performed. This is followed by the resumption of the drilling operation for the 0.100 inch This sequence of operations allows the "cutting off" operation to be overlapped with the drilling of the 0.100-inch hole. If the last turret operation were the reaming and bottoming of the 1/2-inch hole, it would not be advisable to commence cutting off the part until the reaming operation had been completed. This is to avoid the possibility of disturbing the spindle, which might affect the close tolerance on the counteredbored hole.

The only clearance time necessary in the order of operations, as shown in Fig. 23, is between the cutting off operation and the "feeding to stop."

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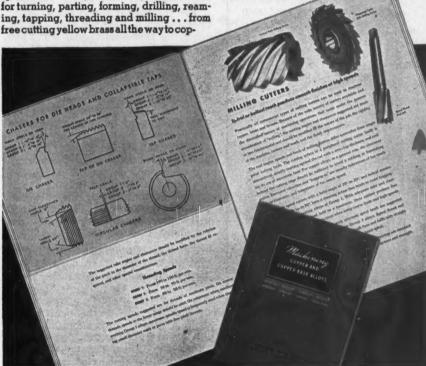
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This clearance must be considered when the diameter of the stock is quite large and the time in seconds is found to be considerable. It allows the cut-off tool to drop back and out of the way before the stock is fed forward. The slow spindle speed being used on this job, necessitated by the tough material to be machined, will require well over 60 seconds. Therefore, the two-hundredths of cam surface shown in Fig. 23 is allowed. This time of two-hundredths is usually ample for estimating purposes.

The throws for the various cutting operations are next determined. The centering throw will equal 0.010 inch for each 1/32 inch of hole size and the throw will amount to 0.160 inch plus 0.010 for approaching the work. For figuring the throw for the large drill, it will be necessary to subtract 0.117 from the 5/16-inch dimension. This amount can be figured by the triangle shown in Fig. 23. A distance of 0.010 inch is also allowed for "approach." The throws for all the drilling operations on the 0.100-inch hole are determined by multiplying the diameter of the drill by the ratio and adding the approach, which equals 0.010 after each indexing of the turret and 0.005 after each pullout.

For the reaming and bottoming operation, two throws are allowed. The second throw will equal the figure obtained from the triangle shown in Fig. 23, or the material at the bottom of the hole due to the point of the drill. This dimension subtracted from 5/16, plus 0.010 for the approach, will equal the other throw. The total throw for the cutting-off operation is figured by allowing 0.005 for approach to the work, plus the difference of the diameter of stock, minus the 0.100inch hole, divided by 2, which will equal the wall thickness, plus the depth of the angle on the cut-off tool, plus 1/32-inch for the heel of the cutoff tool to pass the drilled hole. The

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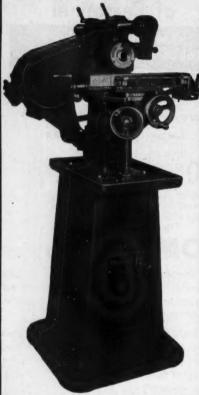
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0.126-inch throw remaining after the drilling operation is completed is found in the same manner as shown in the previous example.

The feeds for the various operations are shown on page 248 of the B & S Treatise under the column for tool steel. The feeds for drilling the 0.100-inch hole show a decrease of approximately 20 per cent for each drilling operation. This procedure has been found necessary when drilling deep holes.

Two feeds are provided for reaming and bottoming the 0.500-inch hole. A

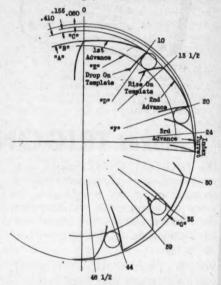


Fig. 24—Drawing to be Used in Conjunction with Chart No. 1 to Determine Hundredths Required for Drill Pull-Outs

standard reaming feed is used for the first 0.200 and a much slower feed is used when the bottoming of the hole takes place. The revolutions for all the cutting operations are determined by dividing the feed into the throw.

A preliminary estimate for the time, in seconds, should now be made; therefore, the cutting revolutions are totalled and approximately 30 extra

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CHART No. 1

Procedure for Determining Hundredths Required for Drill Pullouts

1. Draw diameter of lead cam.

2. On O line, show the three advances of the first drill designated "A," "B," and "C."

3. Draw radial line "D" at 10 hundredths.

4. Set compass at "A" and intersect line "D."

5. Draw the rise of the first advance.

 Having found the approximate time in seconds, use the correct drop on cam template at the end of the first advance.

 Measure ½ below distance "A." This represents the ½" distance the point of the drill withdraws from the end

of the part. 8. Draw radius "E."

 Position a circle which represents the lead cam roll so that it will be tangent to the drop down and the radial line "E."

 Use the rise on cam template to draw a line which touches the cam roll.

11. Transfer the high point of the first advance to intersect the rise in Item 10.

Draw a radial line through the intersection. The distance from 10 hundredths to this radial line represents the number of hundredths required for the first pullout.
 Draw a radial line "F" approximately 7 hundredths

 Draw a radial line "F" approximately 7 hundredth from where second drill advance begins.

14. Set the compass at point "B" and intersect line "F."

15. Draw the rise of the second advance.

16. Repeat the Items 6 to 11, inclusive, except the phrase, "First advance," should be changed to read, "Second advance."

When determining the pullouts for the second drill, the same procedure should be followed. However, after the first advance of the new drill, the drop back "G" will equal the total depth of the previous drill plus the first advance of the new drill plus the \%" for clearance.

revolutions are added for each idle movement, such as feeding the stock, indexing the turret and the drill pullouts. When the total has been found, we refer to page 285 of the Treatise to find the approximate time in seconds. There are two reasons for the above procedure: first, to determine the number of hundredths of cam surface for feeding stock and indexing turret as shown on page 252 of the Treatise, and, second, to decide what drops and rises on the B & S cam template should be used in determining the number of hundreths required for the drill pull-outs, as shown in Fig. 24 and Chart No. 1.

The approximate number of seconds

for this job is 180; thus, referring to page 252, we find that three-hundredths should be allowed for feeding the stock and two - hundredths for each indexing of the turret. The hundredths for the drill pull-outs determined by the method shown are entered in Fig. 23. then the revolutions and hundredths columns are added. The revolutions total 933 and the hundredths equal 31, therefore, the 933 revolutions equal 69 - hundredths. The 933 revolutions are multiplied by 100 and divided by the 69hundredths. The answer is 1,352 revolutions, and on page 285 of the

Treatise, the nearest figure for total revolutions under the 417 spindle speed column is 1,355—which equals 195 seconds to make each part.

"The Care and Maintenance of Dumore Fractional Horsepower Motors" is the subject of Bulletin 30 prepared by The Dumore Co., 182-L, Racine, Wis. The proper procedure for the general cleaning and overhauling of such motors is fully explained as well as the most efficient methods for cleaning and replacing sleeve bearings, ball bearings, and needle bearings. The care of gear units and the lubrication of all parts are also fully outlined. Each problem and procedure is clearly illustrated with photographs, cutaway views, and diagrams. Copy of Bulletin 30 free. 44 F

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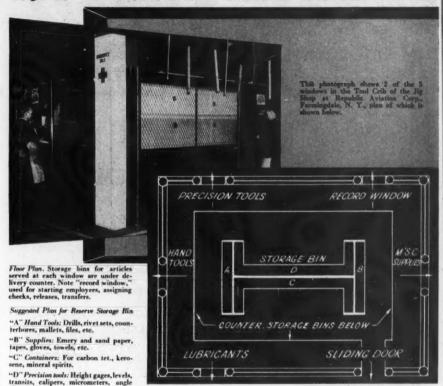
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Your layout may not need to be so elaborate; but careful planning of your tool crib to assure free movement and systematic order always results in longer life and more effective use of your tools.





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GREENFIELD, MASSACHUSETTS
DETROIT PLANT: 5850 Second Blvd.

WAREHOUSES IN New York, Chicago, and Los Angeles In Canada GREENFIELD TAY AND DIE CORE. OF CANADA, LTD., GARE, OWF.

Tool Conservation Begins in the Tool Crib

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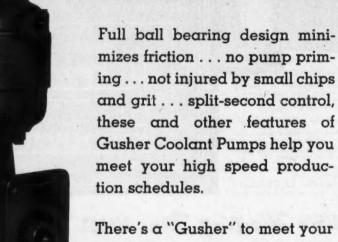
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For FS1660 Production

GUSHER COOLANT PUMPS



There's a "Gusher" to meet your needs. Types and sizes from 1/10 to 2 h.p.

Write for data and specifications



THE RUTHMAN MACHINERY CO.

LARGEST EXCLUSIVE BUILDERS OF COOLANT PUMPS



WALKER MAGNETIC CHUCKS

"THE BEST WAY TO HOLD MOST WORK."
THE ONLY WAY TO HOLD SOME WORK."

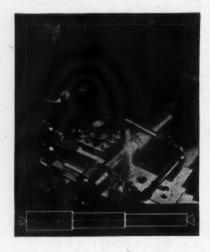
Also belt or motor-driven DC and portable AC Demagnetizers.

Write for Catalog W4.

O. S. WALKER CO., INC.



THEY CUT TURNING TIME IN HALF!



Timesaving qualities of Monarch lathes have never been so important as now. Take, for instance, the job of shaft turning, illustrated. By doing this on a Monarch lathe, equipped with automatic sizing, turning time is cut in half. With the countless numbers of such pieces being used in war production,

Monarch lathe, equipped with automatic sizing, turns these shafts automatically. Similarly, step boring and facing, contour facing, boring and turning, and other combinations of straight and taper turning, can be done fast and accurately. Production is increased, unit costs are cut, and men and machines released for other work.

THE MONARCH MACHINE TOOL

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the saving in time, and increase in production, can readily be appreciated.

Automatic sizing converts a standard Monarch lathe into an automatic engine lathe, for mass production of a wide range of turning, boring and facing operations, all within the required limits of accuracy. One operator can easily run two or three machines, thus again helping to increase output, in the present emergency.

If you are interested in saving time, now or in the future, we suggest that you set your production schedules with Monarchs as the standard lathes,



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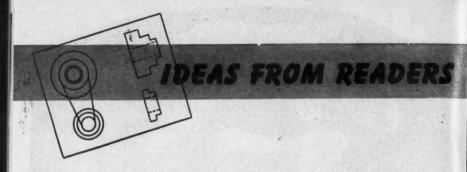
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Home-Made Gas Soldering Iron

By C. F. FITZ

IN these days of priorities and a woeful shortage of materials of all kinds, industries are called upon not only to change their methods to fit the situation, but also to devise tools and equipment that can be made from the materials available.

The manufacture of our product includes a large number of soldering operations which, in the past, have been performed with electric soldering irons. Until they wore out these irons were in use 18 hours a day, with the result that we had to replace the heating elements and extension cords quite frequently. But heating elements and copper wire became increasingly difficult to obtain, so we turned to experimenting with gas soldering irons and finally developed one that would give satisfactory results. This iron, shown in Fig. 1, is simple in design and easy to make, and operates on the same principle as a domestic gas stove in which manufactured gas is used as a heating medium.

The drawings are practically selfexplanatory. The "back-bone" of the soldering iron is the 121/2-inch section of 1/8-inch pipe (5) through which the gas is supplied to the copper tip (3). The wood handle (9) is supplied with a ferrule from a file handle (7) to give it strength. The openings in part (4), operating in conjunction with part (2), make it possible to regulate the amount of air required to obtain proper combustion. The copper tip (3) is held central in the housing (1) by means of two setscrews so that the flame can surround the tip on all sides.

When a rubber hose leading from the gas supply has been attached to the outer end of the pipe (5), it is only necessary to turn on the gas, ignite the gas through the opening in the plate (4) and adjust the plate to provide a gas and air mixture which produces a blue flame, and then proceed with the soldering operation in the usual manner.

We have kept accurate records of

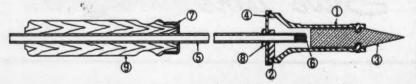


Fig. 1-Cross Section Drawing of "Home Made" Gas Soldering Iron

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He's a strange sort of genius compounded of curiosity,

skilled hands and a peculiar mental twist . . . He has visions of impossible things.

One day recently, the National Inventors Council in Washington — America's clearing house for war-winning inventions — had a letter from him. It read: "Sirs: I've a inventions — nad a letter from him. It read: "Sirs: I've a couple of ideas in my head that may be of military importance. Kindly send me your bulletin so that I'll know what to do to help. Yours for Victory!"

And today, one of those ideas is helping to win the war — literally "Yours for Victory."

This is a typical story of America's Apostles of the Impossible, the inventors, the builders and the basement-bench Edigous who have submitted to the Caucil more

bench Edisons who have submitted to the Council more than 50,000 ideas and inventions in less than 24 months. All have been carefully examined, hundreds are today being tested, and scores are actually at work winning the war and strengthening America's production lines for the peacetime pull ahead . . . But America needs more!

We at Jones & Lamson have a fair share of "apostles." They are attracted to our kind of work. Through more than a century of our history, these men, with visions of impossible things, have helped to design and develop a formidable list of America's great inventions and many of the basic machine tools in the front line of industry today. We've learned to respect their ideas, from the simplest suggestion to the most complex design—on the assembly line and in the laboratory—and we're urging them to help the government by submitting all promising plans to the National Inventors Council.

We hope that you too are seeking out such men, and helping to mobilize their inventive genius for the protection of the country—and the company—they're working for in this emergency.

For any counsel or assistance that we can give to you They are attracted to our kind of work. Through more

For any counsel or assistance that we can give to you or to any individuals in your company on ideas involving the use of precision machine tools, Jones & Lamson engineers and service men are at your call.



Universal Turret Lathes . Fay Automatic Lathes . Thread Grinders . Optical Comparators . Automatic Opening Die Heads

JONES & LAMSON MACRINE CO., SPRINGFIELD, VERMONT, U.S.A.
Profit-producing Machine Tools

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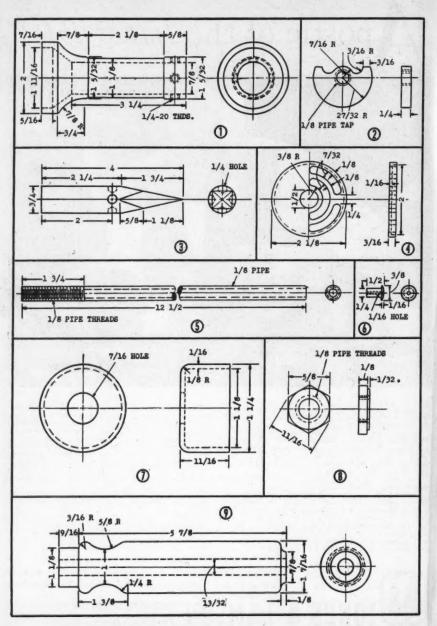
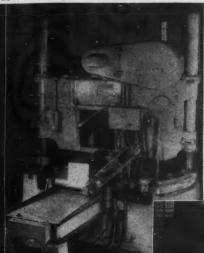


Fig. 2—Details of Gas Soldering Iron Shown in Cross Section in Fig. 1

In most forge shops work starts with



MARVEL SAWS



Sawing off billets is heavy duty work and in most forge shops, as in most other places where sizes are large and cutting jobs tough, you will find MARVEL Hack Saws—usually one or more high speed heavy duty all-

ball-bearing MARVEL No. 6 or No. 9 Production Saws for automatically cutting off quantities of identical lengths, and at least one MARVEL No. 18 Giant Hydraulic Saw to cut-off the largest sizes (18" x 18") and toughest alloy steels in absolutely minimum time.

ARMSTRONG - BLUM MFG. CO.

"The Hack Saw People"

5760 BLOOMINGDALE AVE.

Eastern Sales Office: 225 Lalayette St., New York

the production on this operation, and since we have started using the gas irons the production has equalled—and in some instances exceeded—the production that was obtained when the electric soldering irons were used.

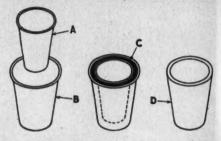
"Home Made" Crucibles Can Be Used When Necessary

By W. A. HUTTON

IKE all other industrial equipment, small crucibles seem to be on the "scarce" list for the duration. However, I had to smelt some ores that I was testing, and remembering the fire-resisting qualities of the old saltand-ash mixture used in boilers and stoves when I was a boy, I decided to try to make a crucible of this mixture.

I burned some wood to get some

new wood ashes, then mixed the ashes with an equal amount of salt. The ashes and salt were thoroughly mixed



Making "Home Made" Crucibles. A and B— Paper Drinking Cups. C—Mixture of Salt and Wood Ashes Between the Walls of the Two Cups. D—The Finished Crucible

first, then wet to the consistency of putty. Having obtained a couple of paper drinking cups, one about half an inch larger than the other, I placed a layer of the ash mixture in the bottom of the larger cup so that the top



INSPECTOGRAPH

"The quality inspection device"

PRICE \$35.00 Size 12" Square.

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Fairfield, Conn.

Better Inspection with Proper Magnification

223 IWOGH2

FLUORESCENT ILLUMINATION

For INSPECTORS TOOLMAKERS MACHINISTS

The Inspectograph does two things:

- The large four inch lens magnifies the inspected object to double its size and provides a wide field of vision for both eyes without eyestrain.
- The two fluorescent tubes project a strong, shadowless light of 300 foot candle power directly on the work being inspected.

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Once installed, American Diesel Engine Exhaust Hose stays on the job for years . . . absorbing vibration, providing permanent tightness against seepage, deadening noise, compensating for expansion and contraction caused by the terrific temperature changes encountered in exhaust lines.

Here's why American stands up so well in this unusually severe service: essentially this hose is a flexible pipe. Made of heavy galvanized steel, it is spirally wound so that each convolution becomes fully interlocked with the next. A continuous packing, fed into a prepared groove, insures permanent tightness.

Whatever your needs in metal hose or tubing, you'll likely find one in the American line that will help you do the job just a little bit better.

42201A



American Interlocked
— wound of strip metal,
joints packed; the toughest type of extremely
flexible metal hose.

American Metal Hose

AMERICAN METAL HOSE BRANCH OF THE AMERICAN BRASS COMPANY
General Offices: Waterbury, Conn.
Subsidiary of Anaconda Copper Mining Company

of of of of other



These CATSKILL Abrasive Cut-Off Machines are cutting gear blanks, unannealed stock, tubing, extruded bars, cylinders, high carbon steel, pipe, etc.—without a secondary finishing operation. Solids to 2" and tubing and shapes to 3".

Cutting wheel runs in a slotted pipe through which coolant is pumped. This prevents surface hardening, burn and burn, and insures a smooth finished cut.

Write for folder.

CATSKILL METAL WORKS, Inc.

CATSKILL

NEW YORK

of the smaller cup, when set into the larger one, would be level with the top of the larger one.

With the smaller cup thus positioned, I filled the space between the walls of the two cups with the mixture, pressing it down firmly. This done, I set the cups into an oven and baked them for an hour at a fairly high heat, baking the mixture quite hard. Then I put the cups into the flame and baked them until they were as hard as cement. In the course of this treatment, the cups burned away, leaving the crucibles.

I have used these home made crucibles in heats that even the best of fire clay crucibles are not able to withstand, and have found them equal, if not superior to, black lead or plum-

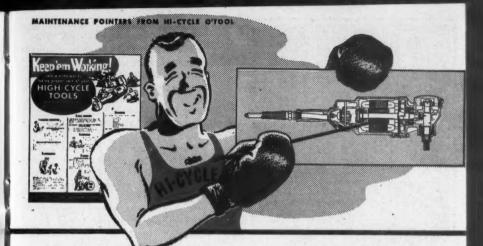
bago crucibles.

Inspection Gage for Checking Draw Punches

SEEKING a method of speeding up final inspection of draw punches, Salsbury Corporation, Los Angeles precision grinding specialists, have developed in their own shops a final inspection gage requiring only onesixth of the time formerly needed for checking draw punches.

This gage, known as Salsbury Corporation Inspection Gage No. 508, consists of a machined base approximately 14 inches long on which is mounted the necessary tool supports and three Koch Test Indicators. The photo shows the set-up. The entire unit, including the Koch Indicators, labor and materials, cost less than \$70.00. According to company officials, it has paid for itself many times.

The tool which this gage was designed to test is a precision ground draw punch, having three tapers. Checking the diameters on these tapers formerly required three separate



JOIN THE MAINTENANCE "REGULARS"

to keep your tools in fighting trim

High-Cyle Tool Maintenance Explained in Booklet

How Often Should Tools Be Inspected? What To Do When Tools Are Inspected. Correct Amounts of Grease To Use. Ball Bearings—Replacement and Care. Switches—How To Prolong Their Life. Care and Repair of Cable. Causes of Stator Troubles and Overheating of Tools.

How To Order Spare Parts. Selection of Frequency Changers. "Shorts", "Grounds", Single-Phasing. Fusing For Peak Output. Safety Rules.

Ask for "Keep 'em Working" Manual

THE simplicity of HIGH-CYCLE tools makes them easier to service than other types of electric tools. They have no brushes, commutators or wound rotors. But, like any portable tools, they give best results with good care.

Preventive maintenance is the kind of troubleshooting that helps most to win the war. Don't wait for tools to break down. Keep'em in fighting trim. Join the "regulars" of tool maintenance:

Inspect them regularly.
Clean them out regularly.
Lubricate them regularly.
Check electrical parts regularly.
Replace worn parts.

... to keep production up and repairs down.

Practical pointers on HIGH-CYCLE tools, of value to maintenance and electrical engineers, are given in the booklet "Keep 'em Working". Its table of contents is shown at the left.

This information in condensed form also is given on a handy wall chart for use by your tool and maintenance departments. A similar Rotor Tool Conservation Plan is available for AIR tools. State your wishes. They're free to plants that will put them to work.

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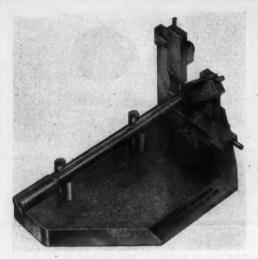
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UNDIASED ANALYSIS OF POSTABLE TOOL PROBLEMS.



Inspection Gage Developed by Salsbury Corporation for Checking Draw Punches

simply by laving the tool on the gage and checking all three diameters at once. By adding additional indicators, as many simultaneous inspections as needed may be made. The gage is not necessarily limited to checking draw punches, but can readily be adapted to other tools.

The gage is not for sale. Salsbury officials explain that they developed it to meet their own production requirements. publicizing its money-saving and time-saving features they felt that other manufacturers with similar production problems might be able to use the idea.

micrometer readings by a trained inspector. These three operations are now done at one time by a woman,

Time Saver for Centering Threaded Pins

By W. S. HOWELL

THE drawing shows a nut to which a steel plate has been welded in such manner that it can be used to locate the center on a pin upon which the nut has been threaded. This accessory was designed for use in setting locomotive cranks to a specified throw, but can be used to locate the center of any pin upon which the nut will fit.

To accurately locate the center on



No. 2 Tapper drives from %" to %".

No. 3 Tapper drives from ''' to l'' in steel or other in steel or other material.

PROMPT DELLVERY ON ALL SIZES

Convert your Drill Presses to Tappers in 1 Write for details.

Dorman Machine Tool Works New York, N. Y. 357 Canal St.

TURRET TOOL POST

Hardened throughout, self-compensating for wear, precision built. For top production on small South Bend, Sheldon, Clausing, Atlas, Logan and sim-ilar bench lathes and small screw machines.



& M SALES COMPANY, HOLLYWOOD, CALIF. MANUFACTURERS AND SELLING AGENTS



The "Gadgets" Production Men Talk About

AND THERE'S REASON for that talk! These resilient abrasive cloth specialties on your own portable or flexible shaft tools save time, pyramid output and improve the product.

TIME IS SO VITAL that when you cut it as much as 90% on many operations, you accomplish something very worth while for your firm's war effort.

Take those tapered "Spirapoints," running at 20,000 R.P.M., for example. Picture how quickly and cleanly they smooth up odd corners, sand little recesses and knock off little burrs with an instant's lightest touch.

IT'S LIKE THAT with all the rest of these Metalite Specialties—Slotted Discs, Spirabands, Pencils and the Moulded Discs for our rubber Mushroom Pads. There's a shape, a size and a grit for every irritating, time-wasting little sanding and finishing job now slowing up some of your most important projects.

You can have a demonstration right on the jobs you select. Just ask.

Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Grand Rapids, High Point, Indianapolis.

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BEHR-MANNING

(DIVISION OF NORTON COMPANY)

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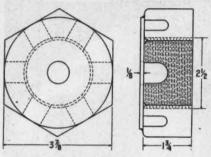
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the plate after the plate has been welded to the top of the nut, the nut is threaded onto a threaded mandrel



Centered Nut for Use in Finding Center of Threaded Pin

after the mandrel has been trued up in a lathe, and a circle is made on the plate with a sharp-pointed tool. The center of the circle is found by using dividers, and a light prick punch mark is made at the exact center.

To set a locomotive crank to a specified throw, it must be known whether or not the crank should follow or lead the pin. Nearly all locomotives now have inside admission valves, and on these the crank follows the pin, with a few exceptions where the forward motion is taken from the top of the link. The crank is set in approximately the correct position by guess, lining up the keyway or estimating the position of the pin in the end of the eccentric crank about 90 degrees from the main crank pin.

The nut illustrated here is then threaded onto the eccentric crank pin and the usual type of crank setting gage is used to set the crank to the specified throw. The gage referred to has a ball center that fits in the axle center while the gage is held square against the end of the axle. A tram point on an arm of the gage is used to locate the eccentric crank pin center.



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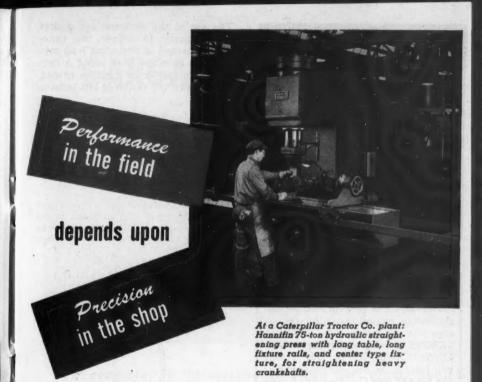
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Many a manufacturing operation, such as this crankshaft straightening job, seems at first glance a long way behind the front lines, until you reflect that the distinguished performance of American equipment all around the world rests upon thousands of such precise details of production.

This precision straightening of heavy crankshafts is made faster, more accurate, easier to handle, by the exclusive sensitive pressure control of Hannifin hydraulic presses. This infinitely variable control of ram pressures delivers anything from a few pounds to full capacity, in proportion to movement of the hand lever or foot pedal control. Because this control is so simple and natural,

accurate straightening can be done rapidly and consistently.

Hannifin hydraulic presses are built in a wide range of standard types, capacities 5 tons to 200 tons, for straightening, forming, assembly, and similar operations. Standard designs can be readily modified to provide the table construction, gap, reach, and ram stroke you need. Write for descriptive bulletins, or consult Hannifin engineers for specific recommendations.

HANNIFIN MANUFACTURING COMPANY 621-631 S. Kolmar Ave., Chicago 24, Ill.

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Hydraulic PRESSES

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USE CUSHION TORQUE

-IT INCREASES OUTPUT



Kanti-Lever Coupling

If you want steady, uninterrupted production . . . lower machine-repair costs ... freedom from bearing troubles and shutdowns caused by misalignment, then take advantage of the CUSHION TORQUE developed by the KANTI-LEVER COUPLING. It not only protects you against the evils of misalignment like the ordinary Coupling, but it goes several steps further and protects your Motors and Productive Machinery against the wear, vibration and fatique that are the source of most machine failures. There is no other Coupling like the KANTI-LEVER . . . it has radial resilient driving spokes of lamingted, spring-tempered, 200,000 lb. steel which operate in taper-side slots . . leverage on the spokes automatically decreases as the load increases ... no end thrust can develop ... protective stops prevent damage to the spokes from extreme overloads. Over 3,000,000 H.P. in service.

Send for Bulletin No. 28-M.

The use of the centered nut makes it unnecessary to follow the timehonored method of pounding lead into the center hole and then using a hermaphrodite caliper to find the center. besides which the centered nut is more accurate.

"Keepers" for Nuts and Washers

By CHAS. H. WILLEY

HE maintenance man or assembler can save time and patience when a nut or washer of the right size is needed if he will keep all of such



Drawing of Spring Wire "Keeper" for Nuts or Washers

parts on spring "keepers" of the type shown in the drawing.

The keeper is made from hard steel wire, bent to the shape shown. The ends of the wire are bent at right angles to keep the nuts or washers from falling off at the bottom, and a bulge formed by curving the wire out-

July, 1943

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... compared to the mechanical brute that proves the surplus tensile strength of Parker-Kalon Socket Screws

This 100,000 pound capacity Olsen Universal Tester in the P-K Laboratory checks every batch of Parker-Kalon Coldforged Socket Screws to make sure that they meet the high Parker-Kalon standards for Tensile Strength.

The tensile test is only one of 16 check-ups that are made to assure the unfailing performance of P-K Cold-forged Socket Screws. This rigid routine of quality control eliminates the "doubtful screws" – screws that look all right, but may fail to work right. Socket Screw users-need this protection today more than ever. Specify Parker-Kalon next time you order . . . it costs no more. Parker-Kalon Corp. 198 Varick Street, New York, N. Y.



This 16-point "Quality-Control" protects P-K Socket Screw Users

1-Chemical Analysis. 2-Tensile Strength.
3-Ductility. 4-Torsional Strength. 3-Ability to take Shock Loads under Tension. 6-Resistance to Shock Loads under Shear. 7-Hardiese: In addition, there is a rigid inspection of these essentials: 8-Head Diameter. 9-Head Height. 19-Concentricity of Head to Body. 11-Socket Shape. 12-Socket Size. 13-Class 3 Fit Threads. 14-Clean Starting Threads.

PARKER-KALON

Quality Controlled

SOCKET SCREWS



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VACUUM PUMPS

Also Used as Pressure Blowers, Gas Boosters, and Air Motors.

They Take Up Their Own Wear



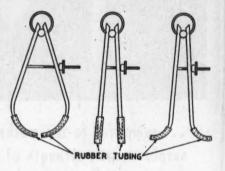
LEIMAN BROS. Inc. 168-1 Christie St. Newark, N. J.

ward as shown will keep them from falling off the top if the keeper should be dropped on the floor or laid on the bench. The keeper can be hung on a nail or hook when not in use.

Protecting Points of Measuring Tools

By A. H. WAYCHOFF

MACHINISTS will find that it will pay to protect the points of their calipers, dividers, and similar tools when a number of these tools occupy the same drawer in the tool



Short Lengths of Rubber Tubing, Slipped Over the Legs of Calipers and Dividers, will Protect Them From Damage in the Tool Chest

chest. The easiest way to protect them is to cut pieces from small rubber tubing and slip the pieces over the legs of the calipers when putting them away. The pieces should, of course, be cut long enough so that from ½ to ½ inch of the tubing will project past the points. The increase in the life of the instruments will more than pay for the small amount of work involved.

Your Life Insurance won't be worth a nickel if we lose this war. Buy Freedom Insurance, too — Victory Bonds !



For quickest deliveries of the supplies you need

Dial the A First

Your Industrial Supply Distributor is alert to your needs and interests, every hour of the day. He knows the many kinds of materials you must have to keep going. He tries to keep you supplied from his many available sources.

He buys on priority—he buys as often as he can—he buys as much as he can get—to cover you and his other customers. Sometimes he doesn't even notify you until the goods are in, or on the way.

Think of your Industrial Supply Distributor as your No. 1 Source. Check with him before you run short. Make it standard practice to telephone your Industrial Supply Distributor first.

Know him? Of course we do—hundreds of "him" in big and little Industrial Cities all over America have distributed Cle-Forge High-Speed Drills and Peerless High-Speed Reamers for years and years—to their satisfaction, and owrs?



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Which INCO Nickel Alloy is FREE-MACHINING?

Consult the tables below for comparative properties of these two metals

Answer No. 1...
TOUGH YET EASY TO MACHINE

Engineers and screw machine products manufacturers already know this metal. Introduced several years ago, "R" Monel offers the corrosion resistance, toughness and

strength of regular Monel, plus improved machining characteristics.

Readily fabricated by cold forming, "R" Monel is available as hot-rolled and

cold-drawn rounds, squares and hexagons. This INCO Nickel Alloy is well suited for automatic production of rust proof screw machine parts, yet has mechanical properties at least equal to steel screw stock (SAE 1112), and is actually tougher.

PROPERTIES OF "R" MONEL

FRO: -				
Condition	Tensile Strength 1000 psi	Yield Strength (0.2% offset) 1000 psi	Elonga- tion in 2 in. per cent	
Cold-drawn, annealed Cold-drawn, as-drawn Hot-rolled, annealed	70- 85	25- 40 50-100 25- 40 35- 60	50-35 35-15 50-35 45-25	110-140 150-230 110-140 130-170
Hot-rolled, an rolled PROPERTIES OF S Cold-drawn, as-drawn Hot-rolled, as rolled	SAE 1112	70-80		

Cold-dra Cold-dra Hot-rolle Hot-rolle

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Which is free-machining and <u>also</u> HARDENABLE by HEAT TREATMENT?

Answer No. 2...

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OFFER EXTRA HARDNESS AND STRENGTH

This metal is the latest addition to the family of INCO Nickel Alloys. Its name..."KR" Monel. Like "R" Monel, "KR" Monel combines corrision resistance and strength with improved machining.

But "KR" offers a big plus . . . through heat treatment this un-

usual metal develops exceptional hardness and strength.

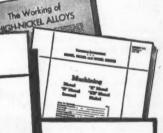
A non-magnetic alloy, "KR" Monel is suitable for production of corrosion-resisting parts, and can be heat-treated after machining.

For complete information on these and other INCO Nickel Alloys, write to:

THE INTERNATIONAL NICKEL COMPANY, INC. 67 Wall Street, New York, N. Y.

PROPERTIES OF "KR" MONEL

Condition	Tensile Strength 1000 psi	Yield Strength (0.2% offset) 1000 psi	tion in 2 in. per cent	BHN 10-mm. ball 3000 kg.	
Cold-drawn, as-drawn Cold-drawn, heat-treated Hot-rolled, as rolled	90-120	40- 85		175-250 260-320 140-225 260-300	



Machining Techniques for both "R" and "KR" Monel are clearly and fully described in Machining Bulletin T-12. Write for as many copies as you can use and also for the reprint "The Working of High Nickel Alloys."

Mey to Mass Production

• In 1798 Eli Whitney went to Washington to demonstrate his idea of identical gun parts. Any part made in his shop was so accurate that it interchanged with the same part in any of his guns.

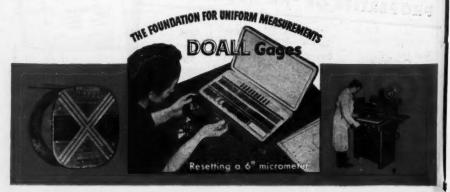
It was soon found, however, that his gun parts would not interchange with parts made by other gunsmiths, because no two shops had a common basis of precision measurements. For more than 100 years after that, there were no undisputed measuring devices.

By 1913, Gage Blocks were accepted by industry as the foundation of uniform measurement. Interchangeability of parts for any machine or equipment became possible between plants, states and even countries.

World War I was tooled up to 1/1000 of an inch; the needs of this war are accurate to 1/10,000 of an inch. When peace comes, these same accuracy requirements will carry over into mass production of civilian goods.

Metal working plants everywhere: Build Your Business On Today's Gage Block Standards. Have sets of DoAll Gage Blocks in each department to provide the necessary accuracies for tomorrow's interchangeability.

FREE SOUND SLIDES—The DoAll man in your locality will gladly bring a portable projector to your plant and show a series of instructive slides on the Care and Use of Gage Blocks. Write for interesting data about DoAll Gage Blocks.



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LOW COST KEYS TO PROSPERITY

SAVAGE TOOL CO., Dept. MM, Savage, Minn.



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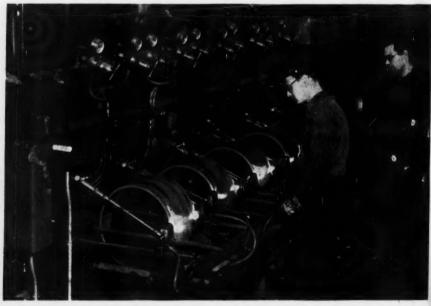
Flame Hardening Bogie Wheel Tire Bases

BOGIE wheel tire bases used on a beating from the sand, gravel, and other abrasive materials picked up and ground between flange edges and track guide forgings.

To give the flanges sufficient resistance to this destructive service, it was formerly the practice to oil harden and draw the whole tire base. This procedure was, at best, an unsatisfactory operation because of the amount of distortion frequently introduced in the tire base by the hardening treatment.

Using specially designed flame ports and oxy acetylene gas, the American Welding & Manufacturing Company, Warren, Ohio, is securing the neces-

The Flange Edges of Bogie Wheel Tire Bases for Army Vehicles are Flame-Hardened with the Equipment Shown Here



184 MODERN MACHINE SHOP

July, 1943

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sary hardness in the bases by flame hardening simultaneously both flange edges to a depth of $\frac{1}{16}$ inch, following this with a shallow (1½ per cent)

soluble oil-water quench.

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The battery of flame hardening units shown here handle five Bogie wheel tire bases at a time, revolving them past the flame ports at the rate of approximately 8 inches per minute. Not visible is a second battery of five units at right. Two men stagger the flame hardening of the individual bases so that the overall operation of the two batteries is a continuous one-with some bases being started on the hardening cycle as others are being removed. Both 14-inch and 16inch diameter bases are flame hardened in this fashion, in from 5 to 6 minutes each.

Production Problem with 8-Inch Gun Part Solved with Vertical Shaper

THE illustration shows the operation of machining keyways in cylinder barrels that are used for the hydraulic control on 8-inch guns. The barrels are forged from SAE 4615 steel, and each is normalized and annealed, about 24 inches in diameter and 10% inches high. The operation consists of machining two 21/2 x %inch keyways in the barrel, producing a smooth finish on the bottom of each keyway, and holding the dimension from bottom to hole center within a limit of 0.001 inch. The sides must also be smooth and the width of the keyway is held to within 0.001 inch overall and central with the hole.

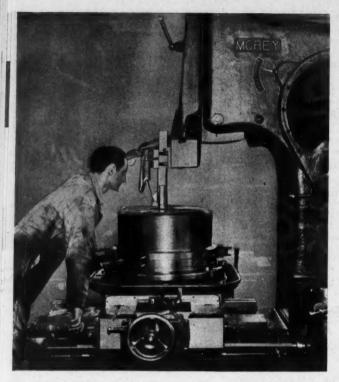
The machine is a Morey Vertical Shaper and the tools are of Stellite. One roughing tool is used, but for finishing two tools are used—one for the bottom and another with two bits for the sides. It has been found economi-



For Jigborors, Boring Mills, Milling Machines. It fits all popular indicators. The above illustration shown complete with extension bar.

No more tiresome tapping your indicator into position. Now — after locking to approximate position, you obtain final setting by simply turning Micro Adjusting Screw. This exclusive, time-saving feature of the OSLUND HOLDER for all popular indicators gives you complete control. Write today for details.





Morey Vertical Shaper Set Up to Machine
Two Keyways in a
Cylinder Barrel for
the Hydraulic Control of an 8-Inch Gun

the sides of the keyway, the cutting edges of the tools being kept relatively narrow to ensure a good finish. In general, it has been found that the longer t h e toolholder. the smaller the cutting edge of the tool must be in order to obtain smooth and accurate cutting. On this job it has been found convenient to apply coolant directly to the cutting points at the top

of the stroke by means of two jets.

The shaper was set for a stroke of 8 inches. Roughing was done at

cal to resharpen the tools after 10 pieces have been machined.

The roughing tool is similar to the bottom finishing tool with the exception that the edge is straight. The bottom finisher has a relieved portion in the middle of the cutting edge, leaving two %-inch wide cutting edges projecting. This prevents "digging in," and ensures a smoother and more accurate surface. It is important to note that this tool, as well as the rougher, was given additional support by means of a rib welded to the toolholder.

A double-bit tool is used to finish

Drawing Showing Size and Location of Keyways in Cylinder Barrel

ock Out = **EXPANDING** MANDRELS Are in a Class by **K-0 Themselves EXPANDING MANDRELS** are made of high quality steel, hardened and ground. Accuracy of less than .001" is maintained for the life of the mandrel. Size ranges will accommodate work from 3/8" to 51/2". K-O mandrels can be purchased singly or in convenient sets with metal boxes. K. O. LEE COMPANY. Aberdeen, South Dakota KNOCK-OUT Gentlemen: Please send me bulletin No. M-42-M. Name_ Company. Street Address State.

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Using "Wiring Boards" at Vega Aircraft to Assemble Electrical Wiring Before
Installing in the Planes

a speed of 19 strokes per minute, with a feed of 0.012 inch per stroke. The finishing speed is 31 strokes per minute with a feed of 0.002 inch per stroke. Each block was finished complete (two keyways) in six hours.

Use of Wiring Boards at Vega

WARTIME necessity for full speed ahead even in the most minute operations of aircraft production has resulted in an industry-wide effort to call upon every known device that will roll the planes down the assembly lines at a steadily accelerating tempo.

In this quest for getting more done in less time than it took before, the Vega Aircraft Corporation of Burbank, California, has, among countless other short cut and work simplification measures, designed a "wiring board" by the use of which assembling of electrical wiring is done more efficiently than ever before.

Although the basic principle of wiring boards is not new, several outstanding features and improvements have been introduced at Vega which greatly facilitate the production of B-17 heavy bombers for the U. S. Army Air Forces. By increasing the efficiency of the operators and the service value of the wire assemblies, Vega is able to reduce the average time necessary for wiring the B-17—which is entirely an electrical airplane—to about two-thirds that of a smaller airplane which uses electrical equipment only to a limited extent.

A "wiring board" generally comprises a wooden table on which the path of the wires which constitute the wire circuits is traced. Posts are located alongside the trace to keep the wire in place as it is laid on the board. The wires are laid one at a time and are then laced together. The



How to make Good Motors BETTER

NEW Catalogue

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Lists and describes the most complete stock bearing service available. Write for your free copy. It makes little difference whether you are buying, building or repairing motors, Johnson Bronze can help you. In new equipment we can help you design the type of bearing that will guarantee the most efficient operation. For replacements, we offer you the largest range of sizes and types in bearings available. In order to get the most from your motors—consult with Johnson Bronze. Let us help you make good motors BETTER.



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Like most every other job shop operator, Paul Ehrhardt is swamped with jobs he never did before. Things people used to throw away, he now welds for further service . . . tractor cleats, sprockets, gears, housings, levers, lawn mower parts, etc. In addition, he fabricates parts for war industry, and at night teaches welding . . . a schedule that leaves no leeway for gadget-fussing or time out for maintenance. For that kind of service he switched to a-c welding.

From his Westinghouse All-purpose A-C Welder he gets the speed he needs—20% to 30% faster welding. He has no arc blow or maintenance to contend with, and he can turn out consistently better welds. Add to that, ample capacity for all types of job shop work, lower first and operating costs, simplicity of control, availability, and you have Mr. Ehrhardt's reasons for selecting the Westinghouse A-C Welder.

Before adding to or replacing present equipment in your shop, look into Westinghouse A-C Welders. Ask your Westinghouse Distributor or write for A-C Welding Booklet B-3136, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N.

Westinghouse



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A-C WELDERS

EXAMPLE:

FABRICATES war products...
makes vacuum-tight welds on
housings for vacuum systems
using Westinghouse DH and
SW electrodes.



EXAMPLE:

MAINTAINS vital equipment. Hard-facing tractor cleats with Westinghouse Hardentough electrodes lengthens cleat life 3 to 5 times.



EXAMPLE:

REPAIRS cast steel buildower drive sprockets. Break was burned out, pre-heated and welded with Westinghouse FP electrodes.



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July, 1943

complete assembly thus obtained constitutes a harness which is ready for

installation in the airplane.

The boards at Vega have been so designed as to permit the simultaneous assembly of several harnesses. This permits a better labor load distribution and a maximum utilization of the assembly board and space. Some of the boards are used not only for assembling but also as test boards for checking the continuity and resistance of the circuit so that no wiring errors develop.

Another feature of the Vega boards is that they are placed at an almost vertical angle with consequent saving in floor space and convenience of wiring. They are so arranged that women operators who never before saw the inside of any kind of a factory can do this wiring quickly and easily with but very little instruction.

The use of the wiring boards and harness in place of the conventional conduit presents a number of advantages from a manufacturing and airplane weight standpoint. It not only saves aluminum tubing, but also storing, handling, cutting and bending. Furthermore, conduit must be installed in the airplane, and the wires then pulled through it in the crowded space of the fuselage—a long and expensive operation.

By the use of open wiring the weight of the conduit is eliminated and the time necessary for the wiring of the airplane is cut down considerably. In case of direct hit by shrapnel or a bullet the open wire circuits are easier to repair than the conduit

type circuit.

Unconventional, But It Does the Job

WHEN machine tools builders reported that they were too busy to undertake the job, General Electric built the 200-inch gap lathe shown

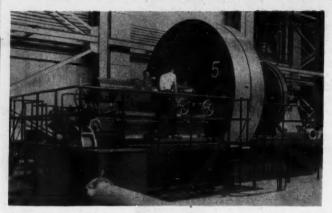


NEW D-C WELDER WITH ARCONTROL

Single, pre-set current adjustment. Capacity to handle all kinds of work. 200, 300 and 400-ampere models. J-21279-A

COMPLETE LINE OF WELDING ELECTRODES





200-Inch Gap Lathe with Concrete Base. Built by General

here to turn marine reduction gears at one of its New England plants. The big lathe incorporates some departures from conventional design practice that helped get it into production faster than would have been possible otherwise.

For example, concrete is used in

place of steel for the base, an expediency which saved months. A simply designed

face plate and spindle is employed with a standard small headstock. No large parts were used in the machine, permitting some of the work to be subcontracted. The machine can be operated over a wide range of speeds. Duplicates have been built and are in operation.

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SAVE TIME · MONEY · STEEL

This photo shows how Masonite® Die Stock was used by Schlenzig Manufacturing Company, Philadelphia, to build a six-foot-long stabilizer rib mating die.

MANUFACTURERS all along America's wartime production front are saving time, money and steel by using Masonite Die Stock for special types of mating dies, forming blocks, templates, jigs and fixtures.

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This amazing semi-plastic material has great compressive and flexural strength . . . stands up under present-day production requirements . . . can be fabricated in pattern or metal shops with great speed.

Only one-sixth the weight of steel, Masonite Die Stock produces dies, forming blocks, jigs and fixtures that can be easily handled in and out of hydro press or power brakes, etc., by either men or women—hoists or cranes are seldom required.

Masonite Die Stock is available in thicknesses of ¼ to 4 inches . . . in sizes of 48 x 72 inches and 48 x 144 inches. For further particulars, please mail coupon below.



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MODERN MACHINE SHOP

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Braille-Type Comparator Inspection Gage in Use

has the endorsement of the National Society for the Blind.

The Braille instrument is the outgrowth of the newly perfected "Micro-Chek," which in a few short months has been put into use by more than 1,400 war plants and government arsenals in the United States and Can-

ada. The device visually checks dimensions with split-thousandth accuracy.

Since the instrument multiplies dimensions by as much as 200, and is equipped with a large, easily-seen gaging indicator which moves between two fixed indicators showing the tolerance limits, inspectors can use the instrument for hours without fatigue or eye-strain. The fixed indicators

Comparator Inspection Gage Developed for Blind Workers

THOUSANDS of blind men and women now can be recruited for war production as the result of the development of a Braille-type comparator inspection gage by Trico Products Corporation, Buffalo, N. Y. The instrument, known as the Micro-Chek.

BRADY-PENROD MODEL 7500 Centrifugal coolant pump and tank—a neat, compact unit highly suitable for use where abraives are a factor.

Good pumps PAY. Buy the kind used as standard equipment by many leading machine tool manufacturers—BRADY-PENROD. Model 7500, shown above, is one of a complete line designed to meet every need. It handles all coolant liquids—kerosene, solubles, light and medium oils, etc., 4 to 100 g.p.m. Tank sizes, 6, 15, 30 gal. or larger, with as many hoses and nozzles as required. Discharge pipe is cast integral with pump and brought to outside of tank. The hinged cover allows cleaning without disconnecting return line.



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SEVERILE HOLD HEAT PROPESS DOUBLES





Severance

MIDGET MILLING CUTTERS • PRECISION REGRINDING SEVERANCE TOOL INDUSTRIES, INC., SAGINAW, MICH. • PLANTS IN LONG ISLAND CITY, N.Y.; DETROIT, MICH.; FORT WAYNE, IND.; CHICAGO; AND LOS ANGELES

"Severite," an exclusive high speed tool steel hardening process, is now available at no additional cost on all new Severance Midget Milling Cutters and any make of tools which you have reground by Severance. "Severite" is the result of exhaustive experiments and field testing on the part of Severance engineers to help conserve America's critical supply of High Speed Tool Steel. And the result has been most gratifying -users report that the "Severite" process increases the efficient life of cutters from two to five times. This extra service, offered only by Severance, is one more reason why it will pay you to use new Severance Midget Milling Cutters and Severance Regrinding Service. Write for complete information and prices.

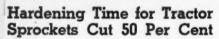
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1e is ly hs ру ts in nny. liis en en 1he ue rs Quenching Teeth on hree Cleveland Tracor Sprockets After the 'eeth Have Been leated by Induction n the Tocco Machine

may be adjusted to any desired tolerance limits, copied from a master part.

In the Braille instrument, the indicators protrude through a slot, so that a finger touch reveals the move-

ment and enables a blind inspector to determine instantly whether the part will or will not meet the tolerance requirements. The Micro-Chek is furnished with various types of anvils for thread-gaging, thread-lead gaging, for internal dimensions, and so on.

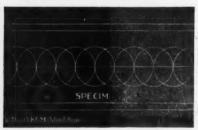


THE time required to harden the teeth of 28-inch tractor sprockets has been cut in half in recent months, due to a modern development in hard-



ening methods and equipment. At the Cleveland Tractor Company, where the job is being done, a "Tocco" machine for hardening the heavy sprockets was installed by the Ohio Crankshaft Company, originators of the process. The sprockets are used to drive the tracks of the high speed tractors that are used at U. S. Government alroots.

Before the installation of the Tocco machine, production on the hardening operation was from 6 to 8 sprockets per hour. Using the Tocco process, approximately 15 sprockets per hour is the rule. This process, according to W. A. Silliman, Chief Metallurgist



DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

Write for full information.

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WARTIME LIGHTING SUGGESTION

Wartime conservation makes it important to take care of your present lighting equipment. The amount of light you get from G-E Mazda lamps depends not alone on the excellence of those lamps and all the 60 years of research that have made them better and better—but on the way you use them. If you want the full benefit of G-E Mazda lamp research, keep your bulbs and reflectors spotlessly clean. Get all the light you pay for.

G-E MAZDA LAMPS

GENERAL @ ELECTRIC



Close Up of Cleveland Tractor Sprocket Teeth Showing Hardened Zone

of the Cleveland Tractor Company, is not only faster than any previously used but is also more precise.

Each sprocket has 20 teeth, and each tooth is tapered from about one inch in thickness at its base to about % inch at the top. The problem was to harden the surfaces of the teeth to withstand the wear imposed by contact with the driving lugs on the tracks, and at the same time keep the rest of the sprocket ductile. Induc-

tion heating—which is the principle upon which the Tocco machine operates—makes it possible to control the depth of the heat

treatment accurately, as well as the area of the hardened zone. The metal is SAE 1045 steel, and is hardened to

60 Rockwell C.

The operator places three sprockets in the machine at a time, each sprocket being surrounded by an inductor. High frequency current flowing through the inductors sets up a current in the sprockets which heats the metal to a temperature of 1,500 deg. Fahr. This heat is maintained for 10

Combination Tap and Drill Grinder



MODERN MACHINE SHOP

SHARPENS TAPS 2-3-4 Flute, Right or Left Hand.

SHARPENS DRILLS 2 or 3 Flute, Straight or Taper Shank.

Grinds DRILLS 1/8" to 11/2" and TAPS from No. 6 to 11/2".

Other Combinations also available.

Write for Catalog.

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DESIGNED FOR TOUGH JOBS

Proved "on the firing line" in industry's tough jobs for a quarter century... Tomkins-Johnson products are widely known today for ahead-of-the-times performance!

More and more, men who demand TOP efficiency and accuracy turn to T-J for Rivitors... hydraulic cylinders... air cylinders... cutters... Clinchors... and air controls for a wide range of requirements. Precise

standards of manufacture...plus careful inspection of all materials... are constantly guarding T-J Quality throughout production.

Our "tomorrow-minded" engineering staff and long experience are continually solving new problems for industry—do not hesitate to bring your Tough Jobs to T-J! Write for bulletins. The Tomkins-Johnson Co., Jackson, Michigan.

TOMKINS-JOHNSON

RIVITORS...AIR AND HYDRAULIC CYLINDERS...CUTTERS...CLINCHORS

seconds, then the current is automatically shut off. A stream of water is turned onto the metal, quenching it for 10 seconds. As one cycle of heating and quenching is completed, the operator pulls the sprockets from the inductor block, sets the index on the fixture, and moves them forward to begin another cycle. By using inductors of different designs, the machine is adapted to a variety of types of heating jobs.

supplies sent to the American troops in the United Kingdom during that period. In addition, our forces have received a vast quantity of other supplies, facilities, and services.

Supplies received by our forces in the South and Southwest Pacific areas from Australia and New Zealand have already included more than 100,000,000 pounds of food, including beef, veal, pork, mutton, eggs, milk, fruits, vegetables, flour, potatoes, sugar, and butter. We are shipping almost no food to American forces in these areas. The shipping space thus released is used instead for tanks and guns.

Lend-Lease

Lend-lease has never been a one-way affair. Our allies are supplying the United States with supplies and services as reciprocal lend-lease, without dollar payment on our part.

Supplies other than constructional materials received by United States forces in the United Kingdom along from May to November, 1942, would have taken 1,200,000 ship-tons if shipped from the United States. This is more than the tonnage of

Cincinnati No. 2-24 Automatic Rise and Fall Milling Machine. A 20-page catalog now available from The Cincinnati Milling Machine Co., Cincinnati, Ohio, contains a concise description, illustrations, and complete engineering specifications of the Cincinnati No. 2-24 Automatic Rise and Fall Milling Machine—a unit which is especially designed for milling parts for machine guns, rifles, and side arms. Copy of Catalog M-909-1 free upon request.

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SPARE PART BOXES

under Government Specifications

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Stackbin offers you unusual facilities to fabricate these boxes and other sheet metal products

Behind these special products stand the designing experience and production facilities of a leading maker of parts and materials handling equipment. You can take advantage of their knowledge of sheet metal fabrication. Write Stackbin Corp., 53 Troy St., Providence, R. I., to find out what they can do for you.

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Prompt Delivery ?... Yes! **But with Strict** Adherence to Accuracy on "STANDARD" Seasoned

PLUG GAGES

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PROMPT DELIVERY

THE ACCURACY and economy of "STANDARD" Plug Gages is a byword and a "buy word" wherever precision parts are made. Even in today's constant clamor for speed, and more speed, the material, craftsmanship and accuracy of "STANDARD" Gages are faithfully maintained.

Conserve Vital Gage Steel . . . Increase the Life of PLUG GAGES with Hard Chrome Plating

Salvage worn Plug and Ring Gages, save vital gage steel and conserve man and machine time with Hard Chrome Plating by STANDARD. Applied to new Gages as well as to Gages worn below original size, their life is increased 3 to 5 times.



Snap Gages



SNAP GAGES designed for ease in handling and speed in inspection. "STANDARD" Snap Gages are standard equipment for fast, precise war production. Constant analysis of materials and precision inspection at every stage of their manufacture insure the quality, stamina and accuracy of these "STANDARD" products.

SUPER Snap Gages

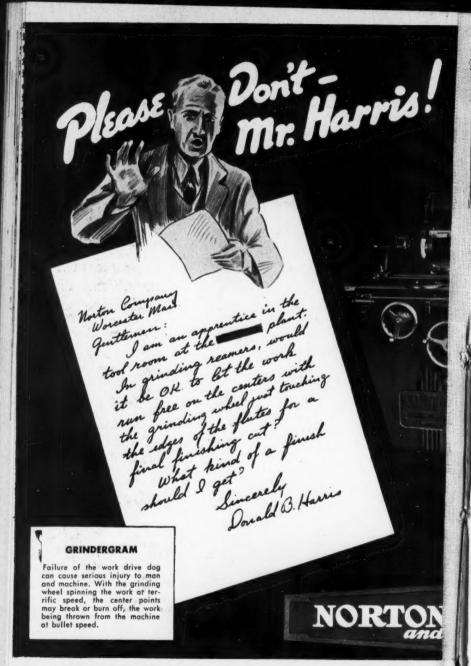
AN IMPROVED Snap Gage with spherical gaging pins that eliminate out-of-parallelism. Easily set, it requires no simultaneous adjustment to a given dimension and to parallelism. SUPER Snap Gage simplifies inspection, speeds production, insures greater accuracy and facilitates setting to closer tolerances. Write for special bulletin.



Complete Stocks Ready for Immediate Shipment



STANDARD GAGE CO., Inc., Poughkeepsie, N. Y.



202

the NORTON doctor knows a better way

WE warned Mr. Harris by air mail that his "finish" may be sudden if he uses this method of grinding reamers. The danger of loose work spinning uncontrolled on centers is well-known to the experienced grinder.

But Mr. Harris did the right thing. He put his problem up to Norton where an experienced group of correspondents is constantly answering questions on grinding and abrasives—is ever ready to help the individual apprentice or the training supervisor.

Visual aids—wall charts, photographs and motion pictures—have also been Norton-produced to assist novice instruction.

A special folder "The Know-How of Grinding" illustrates and describes the various Norton informative booklets that are available. Write for a copy—no obligation.

Norton Company worcester, MASS.

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RINDERS

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THE BULLARD COMPANY

July, 1

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Conserve Victory

By Using

your straight shank drills in taper hole spindles.

The Scully-Jones Style 'B' Drill Chuck has a taper shank to fit the spindle and a straight bare to accommodate the straight drill. At the battom of this hole is a splined section having a width that permits a milled flat on the drill to enter and furnish a positive drive. The inside hole and the taper on the outside are ground concentric, thus assuring a true running drill.

IMMEDIATE DELIVERY

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STONE COURSE PROCESSILL CERTIFY . CHICAGO III C 4

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To KNOW the fundamentals of TAP conservation is to make one tool do the work of TWO. There was a time when a single small tap didn't matter—much. Today, all cutting tools are important. Conserve them.

Used with studied care; the right tap with proper lubrication; WINTER TAPS will produce an unbelievable number of accurately threaded pieces.

Write for your copy of the data booklet illustrated above. It represents the condensed knowledge of taps and tapping gleaned from thousands of thread-cutting problems.

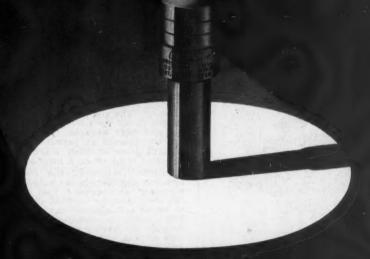
A DIVISION OF

THE NATIONAL TWIST DRILL & TOOL CO.

ROCHESTER, MICHIGAN



WHEN GRINDERS STOP



REDRESS WITH

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RED BAND DIAMOND TOOLS

Third Generation of Diamond Experience

ABRASIVE DRESSING TOOL COMPANY - DETROIT



Delta Chip Breaker Grinder

The illustration herewith shows the Delta Chip Breaker Grinder now being introduced by The Delta Mfg. Co., 602-E. Vienna Ave., Milwaukee, Wis. While primarily designed for grinding chip breaker grooves in carbide-tipped tools, the machine can also be used for grind-



Delta Chip Breaker Grinder

ing form tools, thread chasers, and other units.

An outstanding feature of the Delta Chip Breaker Grinder is a Univise which holds the work at any desired angle. By removing this vise, the machine can be used as a surface grinder. The Univise consists of four component parts, each with a separate circular scale of 360 deg. and each of which can be independently rotated and set. Thus, the vise has four distinct planes of adjustment which enable any desired work grinding angle to be easily and quickly obtained. The vise is designed to accommodate tools up to 1½ inches and is provided with keys on the base which can be removed to permit use of vise on drill press or other machines without table slots, or on a magnetic chuck.

Another feature of the Delta Chip Breaker Grinder is a unique wheelmounting arrangement that utilizes a two-piece adapter so that either wheel or wheel and adapter can be removed. The machine is equipped with an extra long spindle having widely spaced bearings at both ends that are said to provide for permanent true alignment. The forward bearing is a large surface taper bronze bearing which operates in a continuous bath of oil and is provided with take-up to eliminate all play. The rear bearing is a sealed-for-life type.

The specially designed column of the machine is made of a single piece of high tensile cast iron which is normalized and accurately ground to close tolerances. A steel gib is used to guide grinding bracket yoke so that bracket is always in perfect alignment. The entire column together with bracket may be rotated 360 degrees.

Rapid vertical adjustment of the grinding wheel to work is effected by means of an Acme thread screw and large handwheel at the top of the machine column. When close to the work, final fine adjustment is made by a micrometer screw, the micrometer having wide graduations of 0.0005 inch for close settings.

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July, 1

The table of the machine operates smoothly on long ways and is equipped with conveniently located control handwheels. Gibs are provided so that all play due to wear can be eliminated. A micrometer collar with wide graduations of 0.001 inch on the traverse adjustment permits accurate table settings to be made. A T-slot is provided in the surface of the table for clamping fixtures or magnetic chuck in place.

The design of the Delta Chip Breaker Grinder also includes a coolant attachment which provides a proper amount of coolant for resinoid bonded diamond wheels used in chip breaker grinding.

Specifications of the machine are as follows: maximum length that can be ground, 13½ inches; maximum width that can be ground, 6 inches; minimum diameter cup wheel that can be used with standard guard in place, 3½ inch; maximum diameter wheel that can be used, 7 inch; maximum space under 7inch wheel to table, 9½ inches; maximum space under 7-inch wheel to B & S No. 510 Magnetic chuck, 6 inches; table surface, 5% x 13 inches; maximum adjustment of wheel by means of micrometer, % inch.

Sanford High Speed Precision Bench Surface Grinder

Specially designed for small work requiring utmost accuracy and unusually fine finish, the Sanford High Speed Precision Bench Surface Grinder illustrated herewith has been brought out by the Sanford Mfg. Co., 1281 Springfield Ave., Irvington, N. J. The machine features broad, hand scraped double-vee type saddle ways and well proportioned, hand scraped column which is protected by suitable dust guards. The spindle of the machine is made of fine alloy steel and is mounted in precision ball bear-ings which are said to eliminate all vibration and end play.

The precision vertical feed screw of the Sanford Grinder is operated by means of a handwheel having large. easy-to-read 0.0005-inch graduations. The cross feed screw is equipped with a handwheel having large 0.001-inch grad-uations. The table of the machine trav-els on long vee and flat ways which are precision ground and lapped and scraped to provide ample lubrication. The table is fed longitudinally by handwheel through closely fitted rack and pinion. The transverse carriage of the machine slides on long, protected vee ways, set wide apart to ensure rigidity.

EAMERS OGERS

SINCE 1885

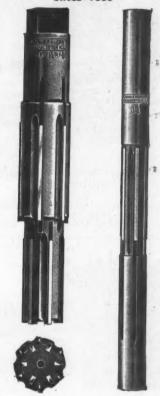


Fig. 37

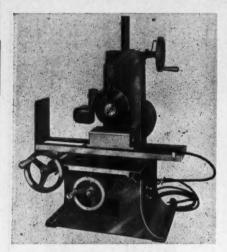
Fig. 39

Conserve High Speed Steel by using Rogers Inserted Blade adjustable-forwear Reamers.

Align and concentric in diameter down to % inch.

Deliveries Good.

JOHN M. ROGERS TOOL CORP. **GLOUCESTER CITY NEW JERSEY**



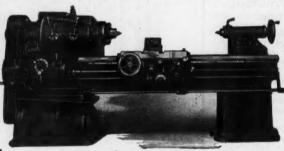
Sanford High Speed Precision Bench Surface Grinder

Standard equipment of the Sanford High Speed Precision Bench Surface Grinder includes V-belt drive with 4 h.p., 3,450 r.p.m., 110 volt, single phase, 60 cycle, a.c. motor; magnetic chuck; tube rectifier which converts 110 volts a.c. to d.c.; dust guards for column; dust cap for vertical feed screw; exhaust type wheel guard, and spark deflector. A cutter grinding attachment which is designed to accommodate cutters up to 6 inches in diameter having either ½, ¾, or 1-inch holes is available.

Specifications of the Sanford Bench Surface Grinder are as follows: maximum longitudinal travel, 6½ inches; maximum transverse travel, 4 inches; maximum vertical movement of wheel head, 6 inches; magnetic chuck, 3 x 5 x 2 inches high; maximum distance from wheel to table under 4-inch wheel, 4 inches; maximum distance between magnetic chuck and 4-inch wheel, 4 inches; standard grinding wheel dimensions, 4 x % x ½ inch; spindle speed, approximately 5,500 r.p.m.; net weight, approximately 140 pounds.

Force Hand Lever Bench Press

Wm. A. Force & Co., Inc., 222 Nichols Ave., Brooklyn, N. Y., now has available a powerful hand lever bench press which

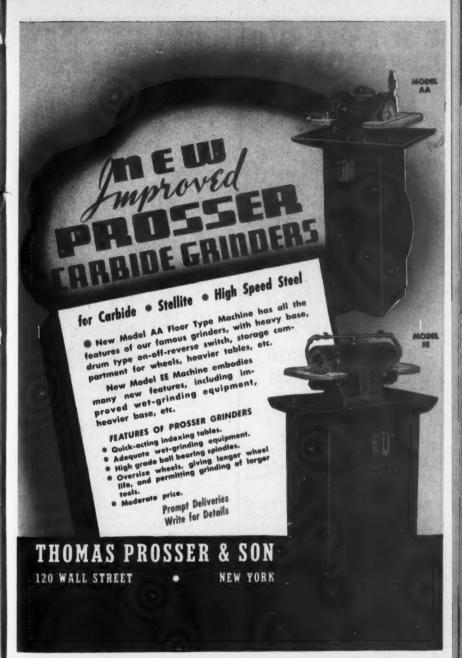


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THE BOYE'& EMMES MACHINE TOOL CO.

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SEATTLEBuckner-Wee	atherby Co., Inc.
TOLEDO	rank D. Lake Co.
Bros. Mach'y Co. Ltd., Montre	al .



July, 1943

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MODERN MACHINE SHOP

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CHICAGO STEEL PRESS

No. 253



SPEED WAR PRODUCTION OF SHEET METAL WORK

USE FOR ...

1. FORMING

2. EMBOSSING

3. MULTIPLE PIERCING

4. NOTCHING

5. BLANKING

of Ammunition Cases, Bomb Box Liners, Bomb Fins, Aircraft Parts and Many Other Offense Products.

The No. 253 CHICAGO STEEL PRESS is accurate, compact, and ruggedly constructed of highest quality materials. Sizes 4, 5 and 6 ft. capacities up to 10 gauge.

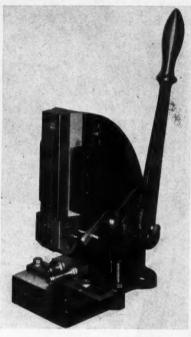
Write for Circular No. 255

DREIS & KRUMP MFG. Company

7418 LOOMIS BLVD.

CHICAGO ILLINOIS

can be used for marking two or more mating parts with same serial number for ease in matching in reassembly. The unit features an automatic numbering head with special trip cam which can be arranged for consecutive, duplicate,



Force Hand Lever Bench Press

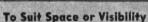
or other type of numbering of small parts. The press as illustrated has the numbering head arranged for duplicate numbering of two mating parts of spark plugs for aircraft engines.

The design of the Force Hand Lever Bench Press is such that the operator, through a toggle lever arrangement, can exert considerable pressure for marking hard parts or slight pressure sufficient for marking extremely delicate watch and instrument parts without damage.

Schauer VA3B-C "Ideal" Variable Speed Lathe

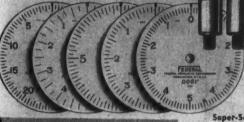
Precise lapping and finishing of metal or plastic parts at a low speed of 100 r.p.m. to a high speed of 4,800 r.p.m. is said to be accomplished through the use

EVERYTHING YOU NEED in DIAL INDICATORS



High Accuracy Sensitive Durable

ANY GRADUATION



Super-Sensitive Indicators



TESTMASTER (UNIVERSAL) Test Indicators



Spindle Indicators

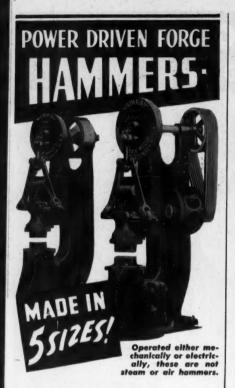


For further information, send for Cotalog
FEDERAL PRODUCTS CORP.
1144 Eddy Street, Providence, R. I.

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Adaptable to a wide range of light or heavy work, for maintenance or production use . . . adjustable for different thicknesses of dies and material . . . extremely powerful yet little effort . . . ram free from obstruction assuring full vision of work, that makes possible use of longer guide. Complete information upon request. Ask about repair parts service.

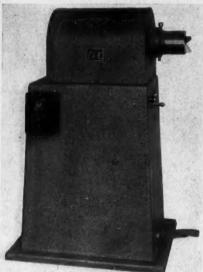
D.J. MURRAY MFG. CO.



Established in 1883-Offices in Principal Cities

of the Schauer VA3B-C "Ideal" Variable Speed Lathe illustrated herewith, product of the Schauer Machine Co., 2060 Reading Rd., Cincinnati, Ohio. According to the manufacturer, the machine is especially useful in removing burrs from heavy types of work and in filing, polishing, and lapping gages, gears, pin-ions, and pulleys.

The variable speed of the VA3B-C is obtained through a Reeves drive which includes unusually strong and durable pulley belts. An improved twin disc



Schauer VA3B-C "Ideal" Variable Speed Lathe

clutch assembly transmits the power from a continuously running motor to the spindle of the lathe when a foot treadle is depressed. When the foot treadle is released, a disc type brake is automatically applied. Selection of the variable speeds is obtained by a ballcrank handle conveniently located on the side of the machine. The variable speed ratio is 6 to 1 for a one-speed motor and 12 to 1 for a two-speed motor.

The spindle and holding devices are contained in a separate welded steel housing which is mounted on a rigid, heavy, welded steel floor type pedestala design that is said to eliminate vibration even when the machine is operated at high speeds on heavy work. The motor is easily accessible for replacement

or removal.

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600 ROUNDS-A-MINUTE...per gun!

NSIDE this Flying Fortress, the side gunner inspects belts which feed up to 600 bullets a minute as the big ship gets set for a trip over enemy targets. For guns like these, the need is absolutely vital for unlimited amounts of ammunition.

In producing not only the ammunition, but guns, planes, ships, tanks, and other weapons, war plants everywhere are increasing output and lengthening cuttingtool life, by using Texaco Cutting Oils.

For example, on both aluminum and magnesium, Texaco ALMAG Cutting Oil adequately cools and lubricates the cutting tools, prolongs their life, increases

Tune in The Texaco Star Theatre every Sunday night C.B.S.

cutting speeds, steps up output. ALMAG is transparent, permitting the operator to see . . . and is non-irritating to the skin.

So effective have Texaco lubricants proved that they are definitely preferred in many important fields.

A Texaco Engineer specializing in cutting coolants will gladly cooperate in the selection of the most suitable lubricants for your equipment. Just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

Help win the war by returning empty drums promptly



TEXACO CUTTING, SOLUBLE AND HYDRAULIC OILS FOR FASTER

Chucks of the conventional three or four-jaw type are furnished with the machine as specified. Special holding fixtures are also available. The chuck end of the spindle can be provided with a taper hole or a removable taper socket.

Clark Surface Facer

A surface facing tool for use on metals, plastics, and other materials is announced by the Robert H. Clark Co.,



Clark Surface Facer

3424 Sunset Blvd., Los Angeles, Cal. The tool consists of a shank, tapered or straight, and body with three adjustable high speed bits which may be set for any diameter within the range of the tool.

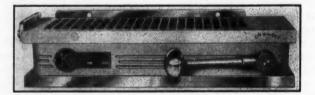
The Clark Surface Facer is available in four sizes which cover diameters from 1 to 4½ inches inclusive. A measuring gage is provided with each tool for use in quickly and accurately adjusting tool to size. The bits of the tools can be easily reground or replaced, thus providing for long tool life.

Federal Model 236 B-123 Rotor Shaft Gage

Marketed by Federal Products Corp., 1144 Eddy St., Providence, R. I., the Model 236 B-123 gage shown herewith is designed to check simultaneously the various diameters of a rotor shaft. The gage is adjustable to take any length of shaft up to 12 inches and can be furnished with gaging units to accommodate any diameter up to 4 inches.

The shaft is mounted between centers so that it can be rotated, thus permitting all diameters to be easily checked. The gaging units and the brackets housing the centers are designed to slide longitudinally in T-slots in the base of the gage and can be locked in any desired position by T-bolts. The bearing surface of the base are scraped while

KAR Permanent CHUCKS



Cannot Fail
Hold Work Tight
Generate No Heat

An outstanding and exclusive advantage of the KAR Permanent Magnet Chuck is its ability to hold smaller pieces securely due to the close spacing of the pole pieces.

Release Easily
Used Wet or Dry
Use No Power



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THE KAR ENGINEERING CO., Inc.

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July, 19

NEW SILVER STREAK

Fine Grit Dry Belts
Last Longer—Cut Faster—Stay Cool!





You only have to TRY these fine grit Silver Streak belts to be CONVINCED they do a better job! They cut faster and cleaner, they stay cool, they won't heat up and draw temper. We would like to prove that they'll last longer than any other abrasive belt you've ever used!

Write to us for a FREE SAMPLE Silver Streak Belt-tell us the grit you need, the size of the belt, and the job you want it to do. Give it a trial, and don't pamper it. Silver Streak Abrasive Belts are available in grits 50 and finer.

Abrasive Products, Inc., 507 Pearl Street, South Braintree, Massachusetts.

EXCLUSIVE AP VELVET JOINT is one of the greatest improvements in abrasive belt making in years. Velvet Joints lie smooth, and do not jump or bump under work.



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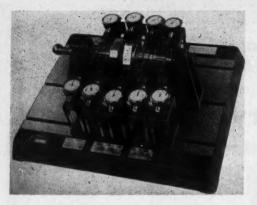
MASSACHUSETTS
JEWELITE • JEWEL FLINT • NEW PROCESS

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those of the adjustable units are ground. The workpiece is accurately held between the centers under spring pressure and can be readily removed by simply pulling out on the knob of the center at the left-hand end of the gage and lifting out the workpiece. The next workpiece is located on the fixed center at the right-hand end, lowered into approximate position, and the left-hand center gently released. As this center seeks the

center hole, the workpiece is automatically centered.

Each diameter of a workpiece is checked independently of the others since each gaging unit is an individual unit consisting of dial indicator, sensitive contact, and fixed contact. The gaging units are mounted on stiff springs and are free to move transversely so as to accurately adjust themselves to the diameters of the workpiece. Movements of the sensitive contacts are transferred directly to

tacts are transferred directly to the indicator points by pantograph units which, in addition to allowing for accurate checking of difficult-to-check diameters, also provide a convenient means for adjusting contacts to a master. The fixed contact of each gaging unit can also be adjusted if necessary.

Indicator dials of the Model 236 B-123 gage are graduated to ten-thousandths of an inch and have a range of 0.025 inch.



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We also are sticking to our "last"

The age old and wise adage "Shoemaker stick to your last" symbolizes the 100% war effort we are making in the manufacture of SIOUX TOOLS for the speedy production and maintenance of war equipment, such as Aeroplanes, Tanks, Trucks, Jeeps, etc.

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usually fitted by knowledge and experience, plus the best of equipment to do it speedily and better. The high standard of SIOUX TOOLS is being maintained in our war work and will be reflected in our peace time effort.

Ask your SIOUX Distributor or write for details.

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WORLD OVER



RESINOID BONDED

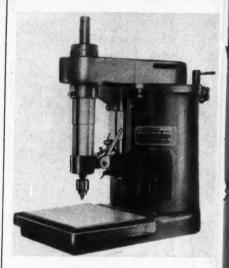
DIAMOND WHEELS

can do your work more accurately, faster and without appreciable wear. They are most economical for sharpening cemented carbide and multi-blade tools, such as milling cutters, broaches. etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding.

Catalog on request. J. K. SMIT & SONS, INC. 157 Chambers St. New York, N.Y. 6400 Tireman Ave. Detroit, Mich.

Sigourney Model M-100 Sensitive **Drilling Machine**

The Sigourney Model M-100 Sensitive The Sigourney Model M-100 Sensitive Drilling Machine now being marketed by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn., is designed so that all moving parts except the chuck and drill itself are fully enclosed in order to reduce the possibility of injury to operator to a minimum. In addition, the machine is heavily, and addition, the machine is heavily and sturdily constructed so as to meet the



Sigourney Model M-100 Sensitive Drilling Machine

requirements of 24-hour operation sched-

The Model M-100 is standardly equipped to operate at spindle speeds of 4,000, 7,000, and 10,000 r.p.m., however, it can also be furnished with a special motor to operate at speeds of 2,000, 3,500, and 5,000 r.p.m. The motor is held in a vertical position inside the column and drives the spindle through three-step cone pulleys with V-belt.

The design of the Sigourney Model M-100 Sensitive Drilling Machine allows

for the use of space blocks of various sizes which, when inserted between the column and base, increase the distance from table top to chuck, thus enabling different sizes of work to be readily handled. The distance from face of column to center of chuck is 4½ inches. The machine is also available in a Model



In suggesting CROCHET in the tool room, we have no thought of converting a busy and important part of your shop into a ladies' recreation center.

On the contrary, many of your tool and die makers and machinists may find this many-purpose "American Swiss" Swiss-Pattern File a help in their precision and accurate filing jobs.

The Crochet file is but one of more than 40 different shapes in the "American Swiss" line of Swiss-Pattern Files, preferred by experienced tool and die makers and machinists because of their clean, sharp, long-wearing teeth and uniform hardness.

American Swiss File & Tool Co., Elizabeth, N. J.

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SWISS PATTERN FILES

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nnn he lel M-100A, the design of which provides a distance of 7 inches from face of column to center of chuck and also allows for the use of space blocks for vertical adjustment.

Both the Models M-100 and M-100A are equipped with sealed ball bearings throughout and can be obtained with one, two, three, or four spindles as desired. A foot treadle is also available for either machine.

Mead Model 10 Midget Air Vise

Especially designed for use in the performance of light drill press operations, bench assembly jobs, and light milling operations such as screw slotting, the Mead Model 10 Midget Air Vise illustrated herewith is now being marketed by the Mead Specialties Co., 15 S. Market St., Dept. 273, Chicago, Ill. The construction of the unit allows for operation by means of a foot control valve.

The jaws of the vise are 1% inches wide x 1% inches deep. The movable jaw slides on dovetail ways, thus assuring smooth action and accurate alignment. The cylinder for operating the movable jaws can be adjusted so as



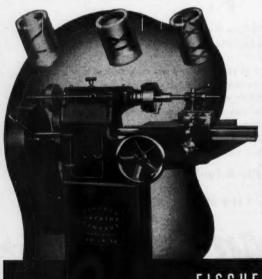
Mead Model 10 Midget Air Vise

to provide jaw openings of from 0 to % inch, % to 1½, and 1½ to 1½ inches. Jaw pressure is said to be eight-tenths of line pressure.

The Mead Model 10 Midget Air Vise is 7½ inches long overall, 3½ inches wide overall, and 2½ inches high overall.

Federal Model 247 B-76 Fuse Body Gage

Designated as the Model 247 B-76, a dlal indicator type gage which is designed to check, in one operation, five entirely separate dimensions of a fuse



FISCHER Oil Groovers

A wide variety of grooves may be cut on the "FISCHER"... with minimum set-up time and cost.

Bearing in which groove is to be cut is mounted on revolving chuck secured on work spindle. Boring tool is secured to carriage slide which has a reciprocating motion timed with work spindle and linked by crank gear and connecting red.

Several attachments can be furnished for cutting practically any type of oil groove.

Capacity of No. 1 Machine — 5" dia. . . . No. 2 Machine—15" dia.

PROMPT DELIVERIES

Write for catalog.

FISCHER MACHINE CO

310-16 N. ELEVENTH ST.

PHILADELPHIA, PA

Compare

THESE METHODS OF SHAVING

ELLIPTOID

(CROWNED)

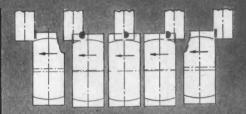
TEETH





SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING



CAM IN-FEED . . . Not Recommended

Here cutting is done by the unsupported edge of the culling tool except at the point of maximum tooth thickness. As the cutter moves away from this point, it produces steps or chatter marks in the tooth surface on the downhill side of the cut.

Cutting serations are not tangent to the point of contact when crowning.

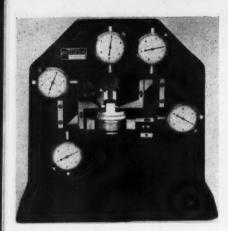
RED RING METHOD

In the RED RING method, cutting clear across the tooth face is done by the central zone of the cutter at the intersection of its axis with that of the work gear where maximum control and smoothness is assured. The amount of crown can be varied to accommodate any particular application.

Cutting serrations are always tangent to the point of contact, thus assuring maximum machine cutting efficiency.

NATIONAL BROACH AND MACHINE CO.

5600 ST. JEAN DETROIT, MICH.



Federal Model 247 B-76 Fuse Body Gage

body is now being offered by Federal Products Corp., 1144 Eddy St., Providence, R. I. According to the manufacturer, the gage is simple to use, unusually sensitive and accurate, and readily portable from one bench to another, and is constructed so that indicator di-

als face the operator as he sits at his bench, thus making the unit convenient for use in performing production gaging operations.

To use, the gage must first be set to a master. A fuse body is then accurately positioned in the gage by simply placing it on three supporting blocks in such a position that the narrow shoulder on the underside of the body contacts the front surface of the supporting block farthest to the rear. The side of the tang must also contact two fixed locators. The indicator dials can now be read and an accurate check of the five required dimensions obtained.

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The movement of each sensitive contact of the gage is transmitted directly to each dial indicator point through a pantograph unit. This feature is said to prevent the dial indicator points from becoming worn or otherwise damaged by constant contact with the pieces gaged. Indicator dials are graduated to five ten-thousandths of an inch and have a range of 0.075 inch.

Reading Tap Grinder

Known as the Reading Tap Grinder, an attachment which can be installed on any type of flat table grinder, all

4-50 LARE Surface Plates!

Rescraping Expertly Done

Lapping Plates Made to Order

WRITE FOR LITERATURE

Many Outstanding Features!

Fine grain alloy castings of uniform hardness—12" x 12" to 96" x 144". Substantially heavier than ordinary plates. Noted for their precision. Ribbed to insure exceptional strength and rigidity. Machined clamping space on all sides. Thousands in use throughout the nation.

SQUARE SURFACE PLATE & TOOL CO.

221 N. MAIN ST. ROYAL OAK, MICH.



Accuracy to .0002"



Clamping Space at Corners As Well As at Sides

Why Air-O-Chek Air Guns Are Leakproof and Trouble Free

The secret of AIR-O-CHEK superiority is the enclosed lever which operates the valve thru a ball and socket joint. This patented feature enables full air discharge with only a slight flex of the hose—eliminates troublesome packing glands, and affords leakproof operation with positive, instant air shut-off.

Air pressure in the hose increases its resiliency. Air shut-off is instant and positive when the hose is released regardless of length of service.

The shank serves as a fulcrum for the internal lever, affording a leverage ratio that opens the valve with a very slight flex of the hose. Operation is easy—operators like AIR-O-CHEKS.

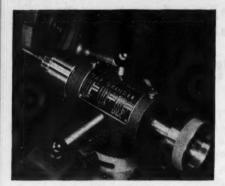
Air-O-chek
The Air Gun you can
install and forget

THE use of AIR-O-CHEK Air Guns by leading plants has resulted from extended service life with saving of time, air and maintenance—benefits made possible by features explained above. However similar in external appearance, no other air gun has these features.

AIR-O-CHEKS are precision machined from bar brass and stainless steel. Furnished in types and sizes for all requirements.

Install an AIR-O-CHEK and compare results with the best you have ever had. Catalog on request.

AIR-WAY PUMP & EQUIPMENT COMPANY, 403 S. Jefferson St., Chicago, III.



Reading Tap Grinder

types of tool and cutter grinders, surface grinders, and cylindrical grinders as well as bench lathes for use in sharpening hand taps up to ¾ inch has been placed on the market by the Reading Machine Co., Reading, Ohio.

Designed for easy operation by inexperienced workmen, the attachment features a built-in chamfer protractor; simple selector for grinding two, three, and four-flute taps; easy-to-follow chamfer diagram on index plate, and positivelocking screw for properly adjusting attachment for grinding desired relief.

Midland "No-Spat" Welding Fluid

A compounded mineral oil product which can be readily applied to welding jigs to prevent the adhesion of weld spatter, to be known as "No-Spat" Welding Fluid, is now being manufactured by the Midland Paint & Varnish Co., Cleveland, Ohio. According to the manufacturer, the extremely low surface tension of the material enables it to soak into the pores of the metal to which it is applied, thus providing a completely non-adherent surface. However, the content of the material is such that it may be wiped or brushed off without difficulty.

"Falcon" Type BRP-A Box-Type Furnace

Designated as the Type BRP-A, a boxtype heat-treating furnace which is said to be suitable for continuous operating temperatures up to 2,000 deg. F. has





A justified complaint is pretty much of a rare experience for Westcott. There's no letdown in our precision manufacturing or inspection. But wartime conditions limit availability of certain special steels. Once in a while, a Westcott, subjected to extra hard usage, may not stand up to peacetime standards. We are doing our best... and we're all in the same

boat! Westcott Chuck Co., 702 East Walnut St., Oneida, N.Y.—since 1872.

Write for Westcott Catalog No. 550.

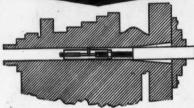


PRECISION · DEPENDABILITY · SERVICE

gd. - he

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Here is an amazing new attachment which greatly simplifies lathe operation, especially in mass production work. Easily attached in few seconds. Inexpensive. Sizes to fit lathes of all types and makes.

- Increases and Speeds Production
- Reduces Rejects
- Saves Set-Up Time
- Assures Uniform Accuracy
- Requires Only Semi-Skilled Operator

MODEL No. 101-Fits all bench-type lathes including South Bend, Logan, Atlas, Sheldon and other makes....

ORDER TODAY! Please give type of lathe and inside diameter of lathe spindle.

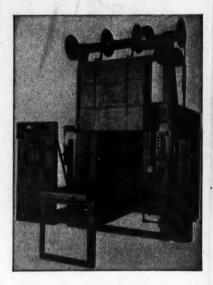
Dealers Wanted

SOLE AGENTS SCHULTZ & ANDERSON CO. 109 EDISON PLACE, NEWARK, N. J.

Manufactured by GREENFIELD MACHINE AND TOOL WORKS been added to the line of "Falcon" boxtype furnaces built by H. O. Swoboda, Inc., 13th St., New Brighton, Pa. Although originally designed for stress relieving, the furnace can be readily adapted to all general heat-treating applications, and is available in chamber dimensions up to 30 inches square x 4

feet 6 inches deep.

The design of the Falcon Type BRP-A Furnace includes a movable platform for charging and discharging, and a push-button controlled motor-operated door opening and closing mechanism.



"Falcon" Type BRP-A Box-Type Furnace

A heater cut-out feature automatically connects and disconnects the furnace

upon door opening or closing.

The Type BRP-A furnace is sturdily constructed and well insulated throughout, and is equipped with high precision controls which permit accurate temperature selection and maintenance. An excess temperature safety feature is provided to prevent burnout should controls fail. Standard equipment of the furnace includes an "On-Off" type prometer control with regulator for varying the input, thus enabling any desired heating, holding and cooling program to be obtained. An added feature of the furnace is a time clock arrangement for turning on equipment at any predetermined time.



by the noise it Noesn't make

You can take hours in putting a beautiful polish on an inaccurate gear-but it won't make that gear any more accurate.

The best test for gear quality-and that means gear life-is not how pretty it looks but HOW QUIET-accurate-it is.

And the fact is that "MICHIGAN"SHAVED GEARS ARE QUIETER even though you need less time, less equipment, less skill, and less money to finish a gear to the desired accuracy on a Michigan than by any other method.

Ask for the new Gear Finishing Manual #GF-43



MICHIGAN TOOL COMPANY

7171 E. MCNICHOLS ROAD . . . DETROIT, U. S. A.

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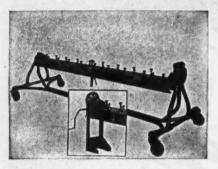
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Clayborne Cylinder Stand

Motor Rebuilding Specialties, Chicago, Ill., announces that its line of engine handling equipment has been augmented



Clayborne Cylinder Stand

by the Clayborne Cylinder Stand shown herewith which is designed for use in assembling and overhauling aircraft engine cylinders. In the standard model, the long cylinder box contains nine openings to receive cylinders, each having a pair of clamps which lock the cylinder in and hold it in a rigid position. The entire cylinder box may then be rotated to any desired position to provide complete access for valve assembly.

The Clayborne Cylinder Stand is available in both portable and stationary models as shown in the illustration. The portable model is said to be useful both in continuous assembly lines and in the overhauling and repairing of engines now in service.

M. & M. Segmental Saw Blade

A segmental type saw blade which is said to be ideal for cutting emergency alloy steels as well as other metals by the cold sawing method is announced by The Motch & Merryweather Machinery Co., 715 Penton Bldg., Cleveland, Ohio. The blade consists of a circular body or disc upon which a definite number of high speed steel segments are mounted and riveted. The disc is made of a special alloy steel which is hardened, straightened, and machined to close tolerances for square cutting. The segments are accurately fitted to

the disc and to one another in such a

DESMOND GRINDING WHEEL DRESSERS and CUTTERS



We, can supply you with the proper Dresser and Cutter for all of your grinding wheels.

Ask for copy of our catalog and name of your nearest dealer.

SIMPLEX

VISES



A full line of Machinists', Filers, Welders, Production and Drill Press and Milling Machine Vises.

Let us send you our vise catalog and name of your nearest dealer.

THE DESMOND-STEPHAN MFG. CO. -:- Urbana, Ohio

WEAPONS OF CONSTRUCTION!

The craftsmen making National cutting tools today know that they are making more than tools. They know they are making weapons -the weapons with which weapons are made.

In your hands these tools deserve the same care and attention that a soldier gives his rifle. Keep them fighting by keeping them working. Keep them working by keeping them sharp.



NATIONAL



TWIST DRILL AND TOOL COMPANY

1943

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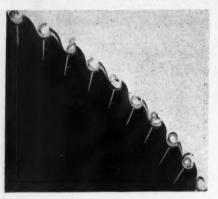
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manner as to form a closed ring. Great rigidity is said to be imparted to the blade as a result of this construction,



M. & M. Segmental Saw Blade

since the segment in the cut is always strengthened by all the other segments around the periphery.

The teeth of the M. & M. Segmental Saw Blade are ground alternately high and low. The high teeth are beveled off on the corners at a 45-deg, angle so that about one-third of the cutting edge of each tooth is applied to the work being sawed. These high teeth rough cut the work. The low or finishing teeth remove the two corners left by the roughing teeth.

Each tooth of the M. & M. Segmental Saw Blade is provided with a lateral backing off which serves as a path for the passage of coolant to the cutting edge, thus minimizing cutting friction. The reliefs are so spaced between the cutting edges of the teeth that the possibility of grinding into the relief channels is eliminated. These coolant channels act like paddle wheels, actually scooping up the lubricant and forcing it to the cutting edges of the segment.

Jansson Height Gage

A vernier height gage especially designed for use in jig and fixture making and for general layout and inspection work is announced by the Jansson Gage Co., 19214 Glendale Ave., Detroit, Mich. The gage is available in three standard sizes of 12, 18, and 24 inches, English or



WILLEY'S

NEW, DOUBLE END CARBIDE TOOL GRINDER

Assures highest accuracy for rough, semifinish and finish grinding of Tungsten Carbide tipped tools. Its sturdy construction insures a large volume of work on a production basis. Uses 8" vitrified wheel for rough and semi-finish, and 6" diameter wheel for finlahing.

Cool Cutting is assured by a steady flow of coolant, force fed by an electrically driven pump.

WRITE FOR FOLDER

Contains complete specifications of Model 30 and other models.

WILLEY'S CARBIDE TOOL CO.

1340 W. Vernor Highway.

Detroit, Michigan



MADE IN 41 STANDARD SIZES—FROM I" to 31/2" DIA.

only NASH-ZEMPEL has these 12 features

- 1. Cutter removed easily for sharpening.
- Cutter always aligned accurately with body of bar.
- 3. Maximum cutter life.

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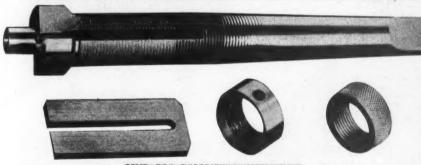
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or

- 4. Milled web locates fingers of cutters while cone nut centers rear of cutter.
- Movement of cutter equals expendable portion.
- Cutting edge of tool always in same place.

- 7. Chip clearance in bar-not in cutter.
- 8. Easy method of locking cutter securely.
- 9. Economical to operate only cutter to replace when used up.
- New cutter—means new spot facer or counterbore.
- 11. Pilot drilled and tapped to hold different size bushings.
- 12. Made in 41 standard sizes. Special requirements made to order.



SEND FOR DESCRIPTIVE LITERATURE

Special sizes can be furnished with pilots, straight shanks or special tapers, other than the standard Morse tapers.

ACME TOOL CO. 198 CHURCH STREET



Jansson Height Gage

metric measure. The accuracy with which the gage is calibrated is said to make it a valuable adjunct to gage blocks in angle measurement and other operations where unusual accuracy is required.

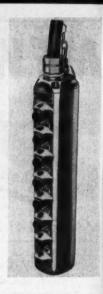
Northern Multiple Speed Push Button

Northern Engineering Works, 2801 Atwater St., Detroit, Mich., has developed a multiple speed push button which, when operated, is designed to provide from one to five speeds. The accom-

these buttons mounted in a pendant.

The Northern Multiple Speed Push Button is of extremely sturdy and simple construction. As the button is pushed in. it moves a metal cylinder over a succession of contacts or steel balls mounted on springs which are stiff enough so as to enable the operator to "feel" the successive clicks yet not stiff enough to make the button difficult to operate. According to the manufacturer, tests of more than two million operations on asingle button indicated no serious button wear.

While designed primarily for oper-



Pendant Containing a Series of Northern Multiple Speed Push Buttons



For this men

TACOL

July, 19

ABRASIVE COMPANY

Doint

WITH
Demountable
Spindles

PATEN1 PENDING

For complete information about this outstanding new development write for our new bulletin on VICTORY POINTS, Form ESA-65. Wheels and Mounted Wheels and Mounted Wheels and Mounted Points . . . switch to Abrasive Company new VICTORY POINTS . . . and save critical steel for war production! Their demountable, replaceable spindles permit quicker changing and greater convenience and more accurate work, since the spindle cannot pull loose, twist or turn.

ABRASIVE COMPANY

DIVISION OF SIMONDS SAW AND STEEL CO.

TACONY & FRALEY STS., PHILADELPHIA, PA. . DISTRIBUTORS IN ALL PRINCIPAL CITIES

943

g a ern ush ating cranes and hoists, the Northern Multiple Speed Push Button can be easily adapted to any machine where pilot or relay circuits are used.

Challenge Round Lapping Plate

To meet increasing industrial demands for round lapping plates, The Challenge Machinery Co., Grand Haven, Mich.,



Challenge Round Lapping Plate

has brought out the lapping plate shown herewith which is 18 inches in diameter x 4 inches thick. The plate is constructed of precision ground semi-steel and is equipped with two handles to facilitate handling. The surface of the plate is provided with a series of grooves running in two directions which cross each other at 90-deg. angles. Larger plates than the one illustrated with either precision ground or hand scraped surfaces are available.

Metron Type 1A Electric Comparator Gage

Constructed for use in the rapid comparison of diameters of wrist pins, crankpins, pistons, and machined parts in general; selective sorting of machined parts for size; checking of out-of-roundness or taper, and checking of shop tools and gages for accuracy and wear, the Metron Type IA Electric Comparator Gage illustrated herewith is now being marketed by the Metron Instrument Co., 432 Lincoln St., Denver, Col. Designed to eliminate the human element of "feel" in close tolerance inspection, the gage can be quickly set to size using a master part or gage block. The part to be compared with the master is placed on an anvil under the gage spindle, an indicating unit immediately designating the amount of deviation from the master dimension.



STANDARD SIZES

18 x 12 x 6 . . . 16 Ge. 18 x 12 x 8 . . . 16 Ge. 16 x 10 x 6 . . . 18 Ge. 16 x 10 x 6 . . . 16 Ge.

> Made in other sizes. 18" x 12" x 6" 16 Ga., \$1.27

TOP RIM STACKING BOX

The Ideal Production Box. Saves Time. Saves Space. Drop or Straight Handles. Prompt shipment.

BENCH LEGS

Four sizes. All Welded. Olive Green enamel.

BENCH TOPS

Steel and wood with or without drawers. Literature on request.



STERLING FACTORY EQUIPMENT CO

183 CHARLES ST. PROVIDENCE, R. I. ded 90-

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In-

ver,

men sweat, takes such a heavy toll in man-hours lost.

Salt tablets restore the

body salt lost through sweating. They help keep

men alert . . . efficient.

In leading industrial plants, salt tablets are

a "must" for men who sweat. They maintain the

will to work through long, hard, hot hours.

MORTON'S Heat-Faa SALT TABLETS

Salt Brings Back That Will To Work

This Is What Happens When Sweating Robs the Body of Salt . . .



Quick Dissolving

Heat-Fag is an ever-lurking enemy in every shop where toil and sweat are writing new production records. Body salt lost

by sweating must be replaced or Heat-Fag sets in. Lowered vitality, fatigue, production slowdowns, accidents and absen-

teeism can often be laid at the door of this insidious force.

The finger of Accidents is always beckoning to the fatigued. inalert worker. That's why Heat-Fag, ever present when

> (Less than 30 seconds) How a Morton Salt Tablet looks when magnified. Soft and porous inside, dissolves in less than 30 seconds with a drink of water.

Case of 9000, 10-grain Salt Tablets - \$2.60 Salt-Dextrose Tablets case of 9000 - \$3.15

Morton's Dispensers They deliver salt tablets, one at a time, quickly, sleanly - without waste. Sanitary, easily filled, durable.

500 Tablet size - - \$3.25 1000 Tablet size - - \$4.00 Order from your distributor or directly from this advertise-ment... Write for free folder.



MORTON SALT COMPANY CHICAGO, ILLINOIS



DUPLEX M-6 BAND AND DISC GRINDER

The latest in pedestal type grinders. Actually two machines in one! 14" disc for all rough work . . . 6 x 48" band for finishing. Precision-built to meet war-time production standards — quickly, economically!



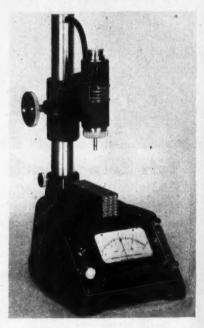
This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 4 x 361/4" band. The ideal portable unit.

OTHER STYLES AND SIZES IN NEW BOOKLET ON FINISHING—WRITE TODAY

WALLS SALES CORP. 96 Warren St., New York, N. Y.

The Metron Type 1A Electric Comparator Gage has four ranges of sensitiv- $-\pm 0.0002$, ± 0.0004 , ± 0.002 , and ±0.004 inch — which provide magnifications of 10,000, 5,000, 1,000, and 500 respectively. Gages with special scales having higher magnifications and wider ranges, and with metric scales can also be obtained. Spindle pressure is variable from 2 oz. to 2 lb. by rotation of a knob and is said to remain constant throughout all ranges after being set.

The gage head is designed for swivel-



Metron Type 1A Electric Comparator Gage

ing around the column and can be tilted at any angle to the vertical, the angle of tilt being indicated on a protractor. The gage can be readily set to size through a rack and pinion elevating mechanism, a vernier adjusting collar on the gage head, four revolutions of which move the spindle approximately of an inch, and an electrical zero adjustment on the indicating unit. The gage head and indicating unit are easily removable from the stand for use in special setups or in multiple gage fixtures. When thus used, the knurled collar at the bottom of the gage head serves as a vernier size adjusting means.

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July, 1943

Announcing the <u>Improved</u> MURCHEY

Collapsible Machine Tap Type "BM"

"For Threading to Extra Accuracy at Extra Speed"

4 WEEKS' DELIVERY

Sturdy-speedy-and entirely dependable. Always simple to operate -simple to adjust. Ready for quick conversion into either a rotating or stationary tool. With handle attached. Type "BM" provides a stationary or non-rotating tap on turret lathes and hand screw machines. By removing handle, it is ready as a rotating tap on drill presses or tapping machines. Its positive and quick operating action-a Murchey Engineering development-protects work, saves production time, increases machine capacity. Murchey tap collapsing mechanism insures instantaneous action. You get accuracy of thread length and you get thread protection in withdrawing tool from work.

Write for your copy of illustrated, descriptive booklet on Type "BM". There's no obligation-write today. Address Dept. M-3.

MURCHEY MACHINE & TOOL CO. BETROIT 26, MICH.



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Illustration Showing Old and New Type Case for DoAll Precision Gage Blocks

Improved Case for DoAll Precision Gage Blocks

A new and improved case for DoAll precision gage blocks which is designed to require a minimum of bench space and can be readily stored in the drawer of a machinist's toolbox is announced by the Savage Tool Co., 123 S. 14th Ave., Minneapolis, Minn. The illustration shows the new case as compared in size to the flat type box in which DoAll gage blocks were formerly sup-

With the improved case, the 81 sizes of DoAll gage blocks are arranged for unusually easy removal and selection. Each block is placed at a slight angle in the case so that the etched size marking near the top of each block can be readily seen at a normal viewing angle. The proper position for each block in the case is marked according to the size marking on the block.

The improved DoAll gage block case is constructed of kiln-dried solid walnut, which is properly treated to ensure which is properly treated to ensure against the possibility of acidity from the wood affecting the highly polished surfaces of the gage blocks. The case measures 11 x 4½ x 2 inches in size.

All hardware is highly plated.

Electroweld Floating Toolholder

Designed for use in screw machines and turret lathes, the Electroweld Floating Toolholder shown herewith, product of the Electroweld Mfg. Co., 1721 N. Ashland Ave., Chicago, Ill., can be used to hold drills, taps, or reamers, the



for SURFACE INSPECTION for ACCURATE COMPARISON

* Acme Optical Flats are finished to a degree comparable to absolute flatness. And, when used to check the flatness of a surface, deviations can be quickly detected and accurately measured. Too, they serve as an accurate comparator in connection with your gage blocks as illustrated at right. • Used with the Acme Monochromatic Lamp that provides light of a single wavelength, interference bands appear clear and sharp through the flats.



Above illustration shows an Acme Optical Flat over work and gage for determination of the size of the work.

Complete Details and Prices are yours for the Asking!



ACME INDUSTRIAL COMPANY

Makers of Standardized Jig and Fixture Bushings 212 N. Laflin St. Chicago, III. MONroe 4122

July, 194

CIRCLE "R" METAL CUTTING SAWS

NO WONDER THEY'RE GOOD

This company has been making circular metal cutting saws since 1923, when it was founded, and all its officers and employees were experienced saw makers for a long time before that. Almost all of our factory space, 20,000 square feet, is devoted to this one product.

So it is a fair assumption that we "know" circular saws. In fact we have to, because our reputation depends chiefly on this one product. No wonder circle "R" saws are good!

Have you tried them? If not, send for our Catalog K.



PRECISION CONTROL

of manufacturing is another reason why Circle "R" saws are good. Our modern heat treating ovens have potentiometric control, — the most accurate method for the purpose.

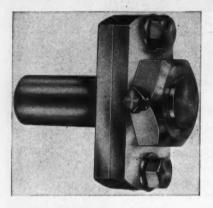
CIRCULAR TOOL CO., INC.

PERFECTIONISTS IN TOOL MANUFACTURING
PROVIDENCE, RHODE ISLAND
CHICAGO PHILADELPHIA NEW YORK DAYTON CLEVELAND
SYRACUSE + INDIANAPOLIS DETROIT - ST. LOUIS



instant alignment of tools with work. construction of the holder providing for Tools can be mounted directly in the

shank of the holder is hardened and ground to resist wear.



Electroweld Floating Toolholder

holder or by means of a split bushing furnished with the holder.

The Electroweld Floating Toolholder is available in three sizes with \(\frac{1}{2}, \frac{1}{3}, \text{ or } 1 \). The

Vickers "Traverse and Feed Cycle" Control Panel

Smooth and constant feed rates, simple and compact design, and ease of installation are among the outstanding features claimed for the Vickers "Traverse and Feed Cycle" Control Panel illustrated herewith, product of Vickers Inc., 1400 Oakman Bivd., Detroit, Mich. Adaptable to drilling, reaming, boring, turning, milling, and swaging machinery, this control panel is designed to provide any cycle sequence of rapid advance, adjustable coarse feed, adjustable fine feed, and rapid return motions. The sequence is said to be obtained without blind or dead spots between phases, and the phases can be initiated by manual, mechanical, electrical, or hydraulic actuation of the control valve plunger.

The cycle is started into rapid advance by manual movement of the control lever, or remotely by auxiliary hydraulic valving, push-button control, or other electrical contact means. Rapid advance rate is a function of the full

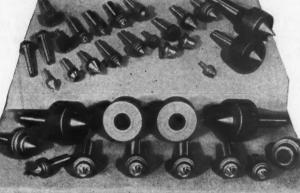


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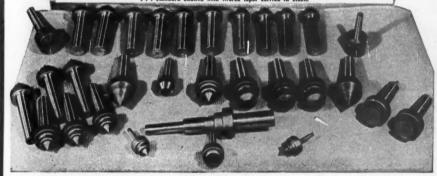
July, 1943



Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low everhang and a slight cushioning action . . .



that compensates for expansion due to heat, shock and excessive thrust leads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience
... standard shanks with Morse taper carried in stock.



Send us your specifications and blueprints—We will see that your job is set up with the right LIVE CENTER—prompt deliveries on high priorities.

TOOL COMPANY 5222 THIRD AVE. DETROIT, MICH.

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pump delivery and the effective cylinder area. Change from rapid advance to feed is normally accomplished mechanically by means of a cam or cams at-tached to the moving member of the machine, positioning the control valve plunger for either one of two prese-lected feed rates. These two feed rates are readily adjustable by dials and can be used singly to regulate the selected coarse or fine feed rate. Only one feed rate is normally required for the average machine tool cycle.

Upon completion of forward feeding operation, reversal can be initiated manually; however, this reversal is usually accomplished automatically by electrically or hydraulically shifting the control valve plunger to the rapid return position. In the event a dwell is required between completion of feeding operation and start of reversal, either a hydraulic or electrical time delay can be utilized for this purpose. Return movement is at rapid traverse rate, utilizing full pump delivery. Upon completion of rapid return motion, automatic stop action is effected by a hook-type cam moving the control plunger to the stop position, where full pump delivery is cir-culated and thus the power load is negligible during the idle period. For alternating rapid advance and feed phases, swinging hook-type cams are required to shift the control valve plunger in the desired sequence.

The control lever can be independently utilized for complete cycle control; it is convenient for set-up purposes and for emergency stop or return.

Blue-Point "See-Eee-Zee" Mirrorview

Especially designed for inspecting work surfaces which are obstructed



Blue-Point "See-Eee-Zee" Mirrorview

from view, the Blue-Point "See-Eee-Zee" Mirrorview shown in the accompanying illustration is now being offer-



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July, 19



Nature's most tragic mistake

THE POSSUM'S LITTER consists of 18 babies. But mother possum can only accommodate 12. At birth, there's a mad scramble for the 12 nipples, and the first arrivals don't budge for 6 weeks! The other 6 babies just look on...and die of starvation.

What an tronic circumstance! A mother forced by fate to watch her own babies starve! And what a pointed illustration of the ruthlessness of Nature. In Nature and in business, the fight for survival is equally vital. Failure to keep abreast of changing conditions has invariably doomed the less alert industrials to business death

Because they affect almost everything we touch,

machine tools will be more necessary than ever in the post-war era. Machine tools are essential today to the output of the food you eat, the clothes you wear, your automobile, your vacuum cleaner, your washing machine, your refrigerator. Machine tools not only create new industries, but they create employment. They are largely responsible for our present way of life... unequalled by any other country in the world.

In our post-war era, Cone Automatic Multiple Spindle Lathes will be even more essential than they are now Their unique advantages will help bring us all higher standards of living than we have ever known before

ONE Automatic Machine Company, Inc., Windsor, Vermont





MORTON STEEL SAFETY PLATE RAMP

Reduce slipping hazards for men and machines. Make trucks roll safer, easier and faster. Loading Ramps with Morton Steel Safety Tread surfaces "grip men's soles."
 This permanent gripping action is secured by the state of the safety of the saf

This permanent gripping action is secured by upset buttons, die formed and perforated. Edges of holes do not wear smooth, and will not retain oil, water or other liquids.

Morton Steel Safety Tread Ramps can be supported in center, as on illustration; or may be stiffened with turned-down edges. Ramp Plates, portable or stationary, are also used to bridge pits, holes, etc.

HEAVY MACHINERY MANUFACTURERS Design Morton Steel Safety Tread ladders, stairs, platforms and catwalks into your machines. Inexpensive, light weight, easy application.

FREE SAMPLE—
To machine shop executives or supervisors sharp cutting edges.

FREE SAMPLE—
To machine shop executives or supervisors MORTON MFS. CO.
5118 W. Lake Street Chicage, Ill.

STEEL TALELY TREADS

INDUSTRY

ed by Snap-on Tools Corp., 8032-D 28th Ave., Kenosha, Wis. An outstanding feature of the unit is a convenient locking device by means of which the mirror, after it has been inserted past obstructions, can be locked at any position within a 90-deg. arc. The locking device is designed for operation by one hand and, when released, permits the mirror to automatically return to a straight position.

The Blue-Point See-Eee-Zee Mirrorview is constructed of tubing, rod, and sheet metal which are zinc plated, and is available in two sizes. The mirror is made of good quality glass which is said to be free from distortion, and is

readily and easily replaceable.

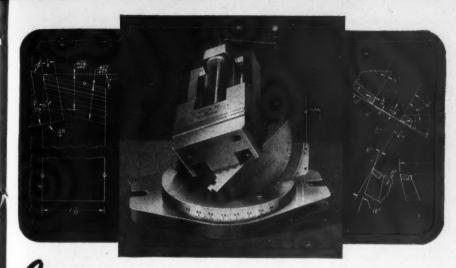
Black & Decker 1/4 and 3/8-Inch Standard Drills with "Drillite" Plastic Housings

In an effort to conserve critical materials, The Black & Decker Mfg. Co., 720 Joppa Rd., Towson, Md., using a new plastic material known as "Drillite," has designed practical housings for its ¼ and %-inch standard drills. The plastic is made with a shredded cotton duck base which gives it a high impact resistance and enables it to withstand



Black & Decker 4-Inch Standard Drills with "Drillite" Housings

July,



tiplies the uses of Standard Tools

You can make standard machine tools perform many "extra" functions . . . multiply the usefulness of these machines . . . do simple or compound angle drilling, milling, grinding, key-slotting, die sinking, reaming and many other difficult precision angle machining operations . . . with WESSON Universal Vises. They slash hours off your set-up and tool-up time! Extreme rigidity . . . freedom from "chatter" . . . permits high precision at high speed! Compact . . . lower height than any other Universal Vise . . . works in closest quarters. Boost production on your present equipment with WESSON Vises!

Less SET-UP TIME

AVAILABLE NOW

WESSON CO... Detroit, Michigan (Ferndale Station) BUILT TO WESSON STANDARDS OF QUALITY AND PRECISION

Greater PRECISION

IMMEDIATE DELIVERIES

Please send me illustrated bulletin of WESSON Universal VISES and ANGLE PLATES.

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considerable abuse and wear. The plastic is also said to be heat resistant and a perfect insulator against dielectric shock.

The Drillite housings are smooth and easy to handle and have a lustrous black finish which provides for a lasting attractive appearance of tools. For long productive life, steel inserts have been cast into the housings to carry all ball bearings, and threaded steel inserts in the field housing for holding assembly screws. Steel air vents provided in the commutator end housing ensure ample motor ventilation.

CARROLL 12 Speed Geared Head Motor Drive Timken Mounted **IAMIESON** Spindle. LATHES 15" AND 16" Modern Design-Liberal Dimensions. Write for Bulletin. MACHINE TOOL CO ATAVIA . OHIO. U.S.A

According to the manufacturer, Black & Decker ¼ and %-Inch Standard Drills with Drillite plastic housings are lighter in weight and have a higher ratio of power per pound than former models produced by the company using metal housings. Both units are available with either end or side handle control, including pistol grip and trigger switch, and with Universal motors for operation on either alternating or direct current.

Kaufman No. 10-A Hi-Duty Single Spindle Lead Screw Tapper

Illustrated herewith is the Kaufman No. 10-A Hi-Duty Single Spindle Lead

Screw Tapper which is now being manufactured by the L. J. Kaufman Mfg. Co., Manitowoc. Wis. Designed for both continuous duty and short run tapping operations, the machine is available in 11/2 and 3 h.p. models having capacities for tapping % and 1%-inch N.C. threads in alloy steel respective-

Features include continuous lubricating arrangement for lead screw and nut: wearproof clutches which



Kaufman No. 10-A Hi-Spindle Duty Single Spind Lead Screw Tapper

are instantly engaged and controlled by means of an air cylinder; quick traverse of spindle where actual tapping is not be-

ANDERSON HAND SCRAPER and BLADES



One blade is equal to an ordinary hand scraper reforged about 5 times. When it is worn out a new blade makes a new scraper. Blades need stoning but no grinding. Blades are

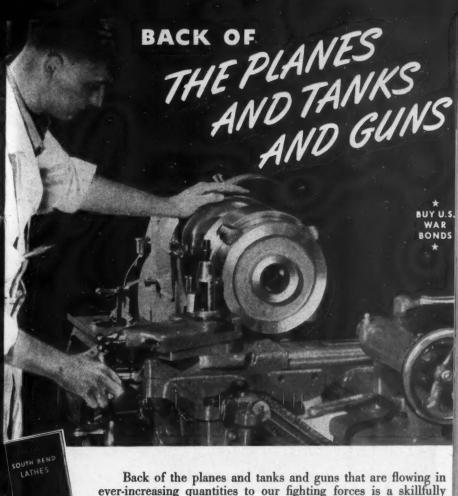


it" thick from end to end and of correct hardness. Three sizes: 4", 1", 14".
Try these fast, cost-cutting tools.

Write for complete details.

1926 KISHWAUKEZ STREE ANDERSON BROS. MFG. CO. ROCKFORD, ILLINOIS

Vrite for Catalog escribe outh Ber



Back of the planes and tanks and guns that are flowing in ever-increasing quantities to our fighting forces is a skillfully coordinated plan of men and machines—a combination of skill, ingenuity and mechanical perfection that is going to win.

Accuracy is the key to success of this great plan. Without the split-thousandth tolerances that assure perfect interchangeability of parts, the production goals could not be attained—and not enough planes and tanks and guns would reach the war fronts.

Capable of fulfilling the demands of urgent war production, South Bend Lathes have the accuracy and speed for the most exacting precision operations, plus ruggedness and power for efficient service. They are made with 9", 10", 13", 14½", and 16" swings in both Quick Change Gear and Toolroom models.

Vrite for your copy f Catalog 100C which escribes all the outh Bend Lathes.

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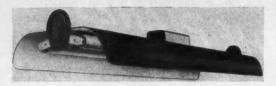
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SOUTH BEND LATHE WORKS

South Bend, Indiana

Lathe Builders For 36 Years



Fostoria Redesigned Generalite Fluorescent Lighting Unit

ing done; elimination of backlash between lead screw and nut threads; accurate depth control; tongue control for protecting tap against overload; arrangement for protecting lead screw and spindle against jamming in event work is placed in fixture upside down; heat-treated and fully lubricated gears, and so on. Special models of the machine include multiple heads and index tables for automatically producing one or two parts at each stroke of spindles.

Fostoria Redesigned Generalite Fluorescent Lighting Unit

Ease of maintenance is an outstanding feature claimed for the redesigned Generalite Fluorescent Lighting Unit

now being marketed by The Fostoria Pressed Steel Corp., Fostoria, Ohio. The unit includes a nonmetallic reflector which is readily removable without turning off the current or removing lamps. By simply loosening two wing nuts, the reflector can be easily lifted off from the top of the wiring channel.

The wiring channel is V-shaped, thus separating the two lamps of the unit and thereby eliminating light absorption from one lamp to another. In effect the channel serves as a reflector, thus providing the lighting unit with a said reflection factor in excess of 85 per cent.

The Fostoria Redesigned Generalite Fluorescent Lighting Unit, all physical dimensions of which conform to recommendations of the Bureau of Standards, is available in a Model MF-240 using two 40-watt lamps and a Model MF-2100 having two 100-watt lamps. Both models are equipped with conventional ballast. Where continuous line lighting or individual four-lamp units are desired, a Model MF-2-240 using four 40-watt lamps, a Model MF-2-2100 using four 100-watt lamps, and a Model MF-2-2100-S using four 100-watt lamps but requiring only one four-lamp ballast can

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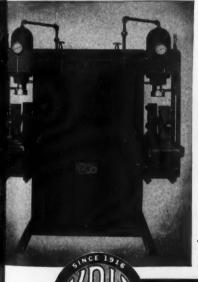




RW HYDRAULIC

for War Production

Standard Hydraulic Presses in 25, 50 and 75 ton capacities. Special Presses engineered for specific war production needs.





The exclusive design features which have given KRW Standard Presses their reputation for speed and efficiency are available to war production manufacturers who require presses of special design. The illustration above shows a special, extra high 75 ton KRW Press in comparison with the Standard 25 ton unit. Opposite illustration shows a special, 4-man operated, air-oil Press used for bomb loading.

K. R. WILSON

10 LOCK ST., BUFFALO, N. Y.



Protect the Work with PARKERS!

Another slip...another reject...valuable man-hours lost, critical materials spoiled! That's what happens when work slips in a vise. That's why so many plants doing important war work use Parker Vises! Parkers grip work evenly, firmly...with accurately controlled pressure. No slack to take up when gripping or releasing because precision-built Parker Vises respond to the slightest turn of the handle! Pinned on tool steel jaws, covering the vise-top, lengthen the life of the tool...are easily renewable. The Charles Parker Company, Meriden, Conn., U. S. A.

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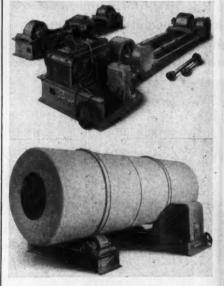
PARKER VISES
AMERICA'S OLDEST

be obtained. The latter model is designed for operation on 265/460 volts, 60 cycle or Y circuit.

All units in the Generalite line are finished on the outside with cloud gray synthetic enamel. The insides of the reflectors and the V-shaped wiring channels are finished in high reflective white. Both inside and outside finishes are near infra-red baked so as to make them hard and marproof, and can be easily maintained with soap and water.

Ransome Turning Rolls for Welding Large Cylindrical Work

Designed for use in the welding of long drums, tanks, and other heavy cylindrical workpieces, the turning roll



Ransome Turning Rolls for Welding Large Cylindrical Work

set shown in the accompanying illustration is now being offered by the Ransome Machinery Co., Dunellen, New Jersey.

The set consists of a pair of motordriven rolls which are controlled through a Reeves Variable-speed unit that provides a range of speeds to meet individual job requirements. A remote pushbutton control for forward or reverse n the fication

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n the Gold Seal Spindle an ingenious modfication of the oil intake admits an air-oil nist, through filters, to the body around he shaft. This jubricating mist is constantly trawn through the moving parts, fore and it, by the pumping action of the exclusive av-Way centrifugal labyrinth seals. This low automatically excludes dirt and coolant rom the spindle.

Maximum service life is further assured by holding torsional vibration and unbalince to an absolute minimum. The rigidity seential to smooth running, high accuracy, and satisfactory finish, is achieved by using he finest of selected extra-precision bearings, applied in pre-loaded duplex pairs. The massive housing is engineered to provide automatic compensation for contraction and expansion. All component parts are deep-frozen to eliminate strain and provide accelerated ageing, with the result that pre-cision alignment is permanently maintained.

The Sav-Way Gold Seal Spindle — the spindle that breathes—has already won its laurels in round-the-clock war production. It will do the same kind of efficient, trouble-free job in your plant!

For a Pre-view of the New Gold Seal Spindle, Attach this Coupon to your Letterhead.

Keep an Eye On

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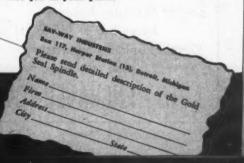
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Say-way INDUSTRIES

* Machine Tool Division *

** Mathematical Control of the Con



rotation is included. Means for changing the center-to-center distance of the rollers for handling work from 2 to 14 feet in diameter is provided. One or more sets of idler rolls are used, according to the length of the work being welded. Units of various capacities for handling work weighing up to 75 tons are available.

Dayton Rogers Adjustable Spacing Collars

The Dayton Rogers Mfg. Co., 2835 S. 12th Ave., Minneapolis, Minn., announces that its adjustable spacing collars for milling machine cutter arbors are now available in sizes ranging from 7% to 5½ inches. Designed to eliminate the use of shims, these collars are said to provide a positive means for properly spacing straddle mills without removing any of the cutters or collars from the milling machine cutter arbor.

A special pin spanner wrench is furnished with each size collar, thus making it possible to quickly adjust the collar as to the plus or minus dimension required in connection with the direc-tion indicator engraved on the outer

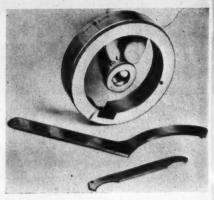


Illustration showing two sizes of Dayton Rogers Adjustable Spacing Collar together with special adjusting spanner wrenches

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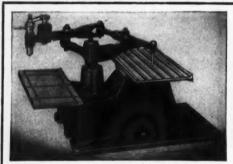
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sleeve of the collar. Each size collar, together with its particular spanner wrench, is supplied packed in a sturdy hinged-cover case.

Dayton Rogers Adjustable Spacing Collars are not only said to be adaptable to the precision spacing of cutters for performing all types of gang milling



NEW DUPLICATING PROFILER - ENGRAVER

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GAGE BLOCK FACTS

"How to"—USE—SELECT—CARE FOR PRECISION GAGE BLOCKS

No. 2 --- They last longer when handled properly!

Gage blocks are measuring tools of the highest order with highly polished surfaces which can easily be damaged by improper handling. If gages are properly handled they will give long, useful service and retain their original accuracy for a long time.

WEBBER gage blocks are delivered to you in a box sealed with a steel band fastened with a crimped red seal bearing the name WEBBER. This is your assurance that these gages have not been tampered with since inspection and packing at our

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WIPE GAGES BEFORE USING

Upon receipt of the gages the blocks should be wiped off with a soft cloth dampened with a few drops of Kerosene to remove corrosion resisting compound in which they are packed. Next wipe off the tray in which gages are packed.

CARE OF BLOCKS AFTER USING

After using the gages wipe them with a clean dry cloth all over. Hold the gage in such a manner that the hands never come in contact with the block. When returning gage to box do not touch the gage with your bare hands.

Always place the block into its proper

place with the wiping cloth shielding the gage from your fingers or hand. If these precautions are taken it is not necessary to apply any oil or grease to prevent gages from corroding.



PROCEDURE FOR STORAGE OR INFREQUENT USE

However, if gages are to be stored or out of use for some time, they should be wiped all over with a small, soft cloth dampened with Webber Gage Lubricant to prevent corrosion. Use the same procedure of handling as before — keep cloth between gage blocks and hands while placing them in box.

Webber Gage Blocks are made to .000004 of an inch and have qualities of wear resistance to withstand shop use, however the precautions quoted above should be closely adhered to when handling and using these precision units.

Because of critical wartime demands Webber's entire production capacity is being devoted to the manufacture of GRADE A

GAGE BLOCKS only.

Prompt delivery assured all firms turnishing the necessary priority certificates. Price for Set No. 84A—\$350.00. Set No. 43A—\$185.00.

Reprints are available for the asking. Write for them.

Webber

GAGE COMPANY
12901 TRISKETT RD., CLEVELAND, OHIO

operations but also to the accurate and precision spacing and adjusting of ball and roller bearings.

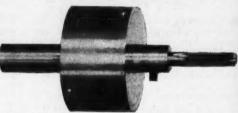
P&H A.C. Welding Electrode

An all-position electrode especially designed for use with a.c. transformer welding machines has been added to the line of P&H equipment manufactured by the Harnischfeger Corp., 4400 W. National Ave., Milwaukee, Wis. Suited for all mild steel applications, the electrode is made in 1/6, 1/6, 1/6, 1/4, and 1/6-inch diameters and 14 and 18-inch lengths. Electrodes are supplied packed in 50-lb, containers.

oped by the R. E. Uptegraff Mfg. Co., 116 Bridge St., Scottdale, Pa. The chuck can be obtained in different sizes to

meet various shop requirements.

After the chuck is installed, the stop on lathe or drill press is set ¼ inch less than full travel of tap so that when the tap is fed in the additional 1/4 inch, the chuck releases and rotates freely. thus eliminating tap breakage. When



Uptegraff Release Type Tap Chuck

Uptegraff Release Type Tap Chuck

A release type tap chuck for use in the turret tailstocks of lathes or in reversible drill presses has been devel-

the machine is reversed and the lever of the machine moved in the opposite direction, a clutch stops the free rotation of the chuck, thereby enabling the tap to be backed out of the work.



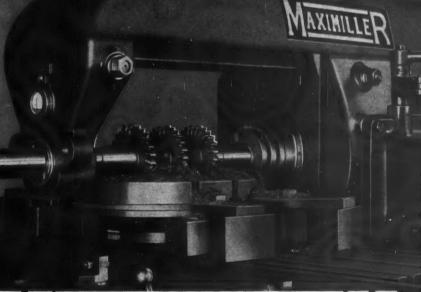
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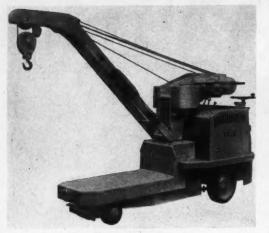
et, .o. When it comes right down to "brass tacks", rugged construction and speedy operation are the most vital features of any milling machine. You get BOTH with the famous KEMPSMITH — industry's better milling machine since 1888.

KEMPSMITH MACHINE CO., Milwaukee, Wis, U.S.A.



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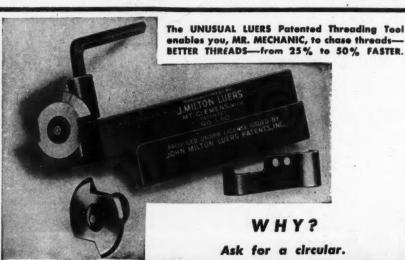
Yale Model K23E-6C2T Crane Truck

A materials handling unit consisting of a 6,000-lb. capacity low elevating platform truck and Yale Cable King 2,000lb. capacity twin unit crane so combined

as to provide maximum efficiency and flexibility i n lifting, hauling, spotting, storing, and transporting materials is announced by The Yale & Towne Mfg. Co., Philadelphia Division, Philadelphia, Pennsylvania.

Designed for easy operation by a single individual, the unit, which is designated as the Yale Model K23E-6C2T Crane Truck, is electrically powered and is equipped with four forward and reverse speeds. The small overall dimensions of the unit are said to provide for maximum maneuverability in close quarters as well as full operator visibility and safety.

The twin unit crane of the Yale Model K23E-6C2T is designed so that the hoist and boom can be operated simultaneously through separate push-button type controls which provide for accurate spotting of loads. Separate, independent motors and power units are used to



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Air & Hydraulic RIVETERS • CYLINDERS

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made product.

THIS STAR FOR SPEEDY SAWING

When the job calls for high speed sawing, call for STAR "Moly"*, the original molybdenum alloy hack saw blade. You can tell it by its copper-color finish, a patented fea-

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With a STAR Unbreakable Special Flexible, you get a standard alloy blade that cuts like an all-hard, eliminating breakage in use and resisting stripping of teeth. You can tell it by its patented green finish.

MID DAETO TO THE WYORK

T. M. W. Blee storing the size of composite, and only of composite, lac. and only of composite, and composite of compos

drive the truck forward or backward and to hoist and boom the load. Slewing is conveniently and efficiently controlled by hand.

Aero Tool Bench Model Automatic Rivet Bucker

Designed to permit a single worker to both buck and set a rivet in one operation, the Aero Tool Bench Model Auto-



Aero Tool Bench Model Automatic Rivet Bucker

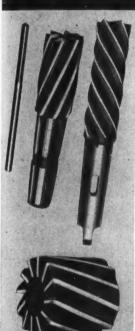
matic Rivet Bucker shown in the illustration is now being produced by the Aero Tool Co., Burbank, Cal. Especially arranged for easy operation by women workers, the unit makes use of a standard rivet set which is synchronized with an air-cushioned bucking bar in such a manner that whenever the rivet set contacts a rivet for forming a head on it, the bucking bar is always located against the shank. The unit is controlled by means of a foot treadle, thus allowing operator free use of both hands.

The yoke of the Aero Tool Bench Model Automatic Rivet Bucker is made

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War-Learned Proficiency Ready for Post War Production

A.C. E. SPECIAL CUTTING TOOLS



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nch ade We are busy—very busy turning out special cutting tools of many types and sizes for a host of defense plants.

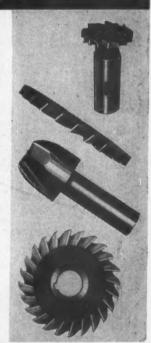
But when peace comes you will find us just as ready to tackle your post war tooling problems with new methods we have learned for better, faster work.

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AMERICAN CUTTER

AND ENGINEERING CORP., WARREN, MICH.

SPECIALIZING IN HIGH SPEED EUTTING TOOKS TO YOUR PRINTS

of %-inch hot rolled steel and is stressed to prevent deflection. The standard bucker has a 15-inch throat, however, buckers with other types of throats are available on order. An easily installed button-type gun can be supplied with the unit if desired.

Ringlock Section Wire Brushing Wheel

The Ringlock Section Wire Brushing Wheel illustrated herewith, product of The Osborn Mfg. Co., 5401 Hamilton Ave., Cleveland, Ohio, is specially designed for use in cleaning out rubber which flows over into the end holes of General Sherman tank treads when the metal and rubber are vulcanized together.

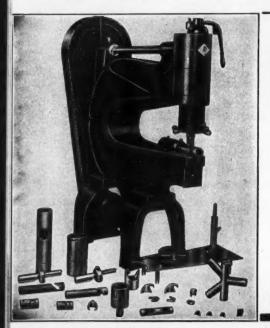
The wheel, which has diameter equal to the inside diameter of the holes to be cleaned, consists of 0.014 steel wire locked in place by a one-piece ring and sleeve, a construction that is said to reduce the possibility of wire breakage and to provide for a dense brushing surface. According to the manufacturer, the wire of the wheel is coarse enough to remove the necessary rubber but not hard enough to mar the metal with



Ringlock Section Wire Brushing Wheel

which it comes in contact. One passage of a metal part over the revolving wheel is all that is said to be required in order to remove the excess rubber.

The Ringlock Section Wire Brushing Wheel can also be similarly used on other mechanical parts that will not be damaged by the wire. The Wheel is designed to remove rust, weld scale, or burrs made by the boring of holes which intersect the hole to be cleaned.



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Atlas Universal Tomahawk

Atlas Universal Tomahawk

An improved chipping hammer for all types of welding cleaning, to be known as the Atlas Universal Tomahawk, has been added to the line of welders' tools manufactured by the Atlas Welding Accessories Co., Boulevard Bldg., Detroit, Mich. The cone and chisel bits and handle of the hammer are readily inter-

changeable and replaceable. The bits have snug socket fits in the head of the tool and are positioned and held firmly in place by means of set screws.

The Atlas Universal Tomahawk is available in two 10-inch models; namely, a standard model with weight of 11 oz. and a heavy duty model with weight of 15 ounces.

Cleco Riv-N-Jector

To eliminate the problem of salvaging rivets and at the same time reduce rivet waste to a minimum. The Cleveland Pneumatic Tool Co., Cleveland, Ohio, has placed on the market the Cleco Riv-N-Jector shown in the accompanying illustration. Use of this device is not only said to eliminate reasons for riveters dropping rivets in constructing aircraft, and so on, but to also relieve them of the necessity of holding rivets in the hand during riveting operations. With the Cleco Riv-N-Jector, riveters are afforded a good, convenient supply of rivets, thus greatly reducing the number of repeat trips they must make to the rivet center.

Designed for easy handling by women operators, the Cleco Riv-N-Jector is un-



S. A. E.

N. E.

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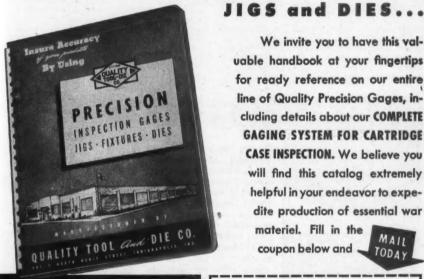
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Illustration Showing Cleco Riv-N-Jector in Use

usually light and includes a magazine holding up to approximately 50 rivets which can be easily loaded by a hopper-loader. A special nose jaw holds a single rivet ready at all times for inserting into the hole of the metal.

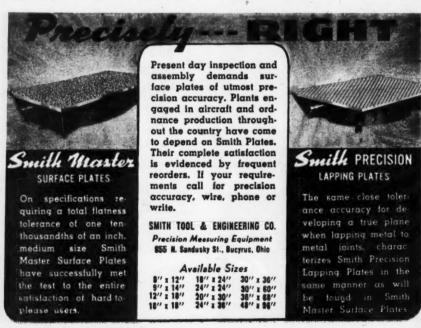
DoAll Steel Ink

A material which is designed for use in precise layout work on dies, templates, and machine parts, locating high spots on scraped machine ways, checking gear tooth contact, and determining the relation of mating surfaces, to be known as DoAll Steel Ink, has been developed by The DoAll Co., 1201 Thacker St., Des Plaines, Ill. A feature of the material is its quick-drying property. Under average conditions, the material is said to dry hard enough to start layout operations approximately one minute after application.

According to the manufacturer, DoAll

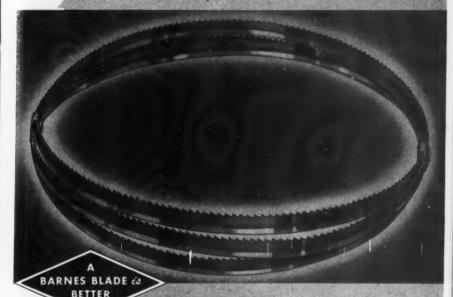
According to the manufacturer, DoAll Steel Ink is designed to adhere firmly to ground surfaces of steel regardless of their smoothness and lack of open pores, its deep blue color providing excellent contrast with scribed lines. The material, it is claimed, will not shrivel, check, or crack, is not easily abraded by the action of chips during machining operations, and is not attacked by machine oil or the usual cutting and soluble oils, yet can be readily removed when desired with an alcohol-moistened cloth.

DoAll Steel Ink is available in 4 and 16-oz. bottles equipped with convenient applicator tops.



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Where Quality is Never an Absentee!



You may worry about your manpower. But you'll never worry about blade quality if the word BARNES is on the box! You get maximum productive efficiency from every Barnes hack saw blade and band saw you buy. Order from your distributor.

W. O. BARNES CO. INC.

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Prestite Fastener

Known as the Prestite, a special long thrust fastener especially designed for clamping unusual thicknesses of mate-



Prestite Fastener

rials firmly together in perfect alignment is announced by the Prestole Division of the Detroit Harvester Co., Toledo, Ohio. The fastener, which is said to be particularly useful in the production of aircraft, is sturdily constructed to provide long life, and is designed so as to enable extremely great spring pressures to be exerted on work with normal safety to operator.

Motion Study Rule

To simplify time and motion study jobs, the Institute of Motion Analysis, P. O. Box 116, Newark, N. J., has designed an inexpensive 6-inch celluloid rule, at one end of which are cut process chart symbols for use as patterns. At the other end of the front, motion elements are listed, while on the back appear 24 principles of motion economy. The rule is white with blue lettering.

Acromark Printer No. 31

The printing of shims, packing, washers, discs, tags, name plates, and other articles is said to be greatly speeded up and accurately performed through the use of the Acromark Printer No. 31 illustrated herewith, product of The Acromark Co., 9 Morrell St., Elizabeth, N. J. As shown, the machine is foot oper-

ated. With each downward stroke of the foot pedal, a printed impression is produced on the workpiece, and on the return stroke, the printing dies or type are reinked for the next impression, the ink platen also being rotated so as to properly distribute the paste form of ink on the ink roll. The type holder used

COLBORNE SPEED-UP FINAL OPERATIONS ON DIES, GEARS. SCREWS LONG RODS, SHAFTS

> For economical polishing, lapping or finishing of gears, shafts, dies, gages, ball races, long rods, etc. Built to meet the requirements of those desiring

a heavily constructed, smooth running machine of highest quality.

Has one H.P. built in motor with variable speed control, using REEVES standard pulley and belt. Smooth automatic brake acts instantly when

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switch is thrown. Collets or chuck may be used.

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Machinery builders since 1879.

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Takes Traffic Immediately

No traffic interruptions when you patch broken concrete with durable INSTANT-USE. Material comes ready mixed. Simply shovel into hole, tamp and run traffic over immediately—without waiting. Bonds tight to old concrete. Makes smooth, solid, lasting patch. Withstands extreme loads. Keep a drum on hand for emergencies. Immediate shipment.

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INSTANT-USE

FLEXROCK CO., 2315 Manning St., Phile., Pa.

is equipped with segment shaped type for printing in a curved line or circle and is readily removable for substituting a straight line type holder if desired.

The Acromark Printer No. 31 can be used to print metal shim material, rubber, cork, plastic, felt, fiber, cardboard,



Acromark Printer No. 31

paper, and fabric. The unit weighs less than 100 lb. and is designed to occupy a minimum of floor space.

Robbins & Meyers "Uni-Shell" Motors

Designated as the "Uni-Shell," a line of electric motors in which all motor types in any one frame size are interchangeable is announced by Robbins & Meyers, Inc., Springfield, Ohio. All motors are provided with a protecting cylindrical steel housing or shell. In any head fit, bolt circle holes, shaft size, one frame size, the shell dimensions, and conduit box mountings are identical for all motor types, including polyphase induction, capacitor start induction, standard d.c., and repulsion induction motors.

All ball bearing motors are equipped



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Model FHM Horizontal Type

For exact position of discharge

FULFLO CENTRIFUGAL COOLANT PUMPS

To serve practically every purpose you can choose from almost 75 models each one engineered, precision-built and dependable in every way. Direct, belt or motor driven. Pipe sizes 3/8" to 11/2". Right or left rotation.

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BY-PASS OIL-RELIEF

NON-CHATTERING VALVES

Five different springs for pressure variation, from 0 to 350#. Pipe sizes 1/4" to 2". Brass, hardened or stainless steel pistons. Cast iron or brass bodies. No attention required after installation.





FULFLO) Specialties Co., Inc. BLANCHESTER, OHIO

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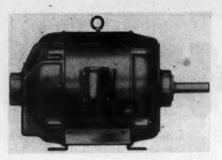
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Robbins & Meyers Capacitor Start Single-Phase Induction Type "Uni-Shell" Motor

with double-row-width ball bearings having unusually large grease reservoirs and complete seals on both sides which are held in place by removable snap rings. Sleeve bearing motors are said to be equally as well constructed. High quality cast bronze bearings, with surfaces burnished to a high finish, are used in both wool-packed and ring-oiler types.

Robbins & Meyers Unit-Shell Motors are efficiently insulated throughout. The motors are provided with smooth,

clean coil slots into which two layers of high grade impregnated rag paper are placed to reduce the danger of weak spots in the coils causing possible short circuits in the motors. The coils themselves are coated with double-weight synthetic resin insulation for strength, toughness, and flexibility. An additional sheet of impregnated paper is placed between the coils in the slots, and an improved method is employed for holding the end coils so that com-plete insulating paper protection can be provided between the phase groups in the windings.

The entire winding assemblies are preheated, dipped in special synthetic resinbase varnish, and baked. As a final protection, the coils are thoroughly covered with moisture-resistant synthetic resin and tung oil sealer. High-voltage insulation tests, both before and after varnish treatment, assure complete, trouble-free insulation. The design of each motor also includes a fan that provides maximum air flow.

According to the manufacturer, accurate bearing alignment and rotor con-struction in Uni-Shell Motors, together with precision balancing, prevent vibration that injures bearings and shortens their life. Three types of rotor balance



universal type

Check These Features

- √ Combination revolving and tilting table for angular machining.
- ✓ Wide range of feeds and speeds for modern requirements.
- ✓ Large direct-reading micrometer dials facilitate adjustments.
- ✓ Lubrigard controlled force feed lubricating system.

Write for Bulletin, GC-12M

GENERAL ENGINEERING and MANUFACTURING COMPANY 1523 South Tenth Street . St. Louis, Missouri

MODERN MACHINE SHOP

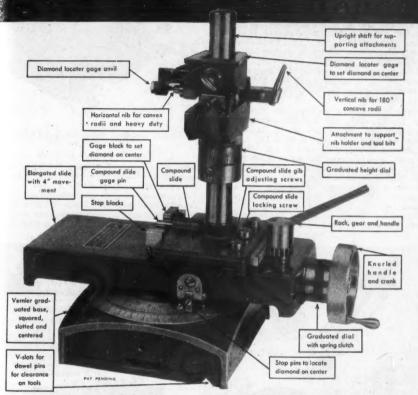
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July, 1943

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July,

THE New MEYERS Microform WHEEL and TOOL FORMER



A "2 in 1" PRECISION TOOL THAT SAVES HOURS IN TOOL and WHEEL FORMING

On tool bits, milling cutters, die sinking and other forming tools, this new Meyers dual-purpose tool completes difficult contours in record time—with keen, sharp outlines, a semi-microinch finish and precise, uniform clearances. On grinding wheels, similar outlines are formed with smooth, sturdy precision.

A compound slide assures angles tangent to radii by simple manipulation. Engineered for mounting on various machines. Vertical and horizontal diamond nibs are furnished for completing 180 concave radii from 2" to 3/16", and convex radii from 2" to zero.

Write for descriptive literature and prices.

W. F. MEYERS CO., (Established 1014 14th St., Bedford, Ind.

Manufacturers' Representatives Wanted In East, West and South.

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are available in all types of Uni-Shell Motors; namely, static, commercial dynamic, and special dynamic balancing.

G-E Totally-Enclosed Tri-Clad Motors

A line of Tri-Clad motors of totally-enclosed design is announced by the Motor Division of the General Electric Co., Schenectady, N. Y. Available in both polyphase 60-cycle induction and single-phase 60-cycle capacitor types, the motors are especially designed for use under conditions where abrasives, chemicals, rain, snow, and excessive dirt are encountered.

The polyphase motors are furnished in frame sizes 203 to 225 and include units which are rated at ½, ¾, and 1 h.p. at 900 r.p.m.; ¾, 1, and 1½ h.p. at 1,200 r.p.m.; 1, 1½, and 2 h.p. at 1,800 r.p.m. and 1½ and 2 h.p. at 3,600 r.p.m. The single-phase motors are furnished in frame sizes 203 and 204 and include units with ratings of ¾ h.p. at 1,200 r.p.m.; 1 and 1½ h.p. at 1,800 r.p.m. and 1½ and 2 h.p. at 3,600 r.p.m. The mounting dimensions of these motors are the same as those of Tri-Clad open-



G-E Totally-Enclosed Polyphase Induction Type Tri-Clad Motor

type motors of the same ratings, thus making the two types of motors interchangeable.

According to the manufacturer, G-E Totally-Enclosed Tri-Clad Motors have all the important basic features of previously announced Tri-Clad motors, in-



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"7riple-Duty"* LIVE CENTERS

Triple Advantages

- 1. Take Heavier Loads
- 2. Turn at Higher Speeds
- 3. Save Cost of Fast Wearing Dead Centers

Get more work, faster work out of lathes, millers, grinders, etc., with IDEAL Live Centers. They rotate with the work, permit heavier loads—faster speeds—deeper cuts. Highest precision ball bearings for radial load, tapered roller bearing for thrust load. All parts hardened and ground.

★ "TRIPLE-DUTY"—Three interchangeable center pieces for all kinds of centered and uncentered work.



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TRIPLE



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IDEAU METAL ETCHERS

This new IDEAL all-purpose Etcher indelibly and permanently marks all tools, parts, dies, etc., made of smooth-surfaced iron, steel and their alloys. With 14 different heat gradations available it etches legibly, regardless of the hardness of the metal. Convenient ground clamp for etching large heavy parts and castings.

MOST COMPLETE LINE ON THE MARKET

FREE

Machine Tool Accessories Catalogue describes many IDEAL Products for speeding War Work.

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cluding triple protection — protection against physical damage, electrical breakdown, and normal operating wear and tear. In addition, all parts of the motor enclosures — frame, end shields, and conduit boxes — are made of cast iron, thus offering unusual resistance to rust, corrosion, accidental blows, and rough use. Also, the leads are permanently encased in compound in a cast-in pocket in the stator frame, thus preventing liquids from seeping into the motor. Still further protection is provided in the form of a rotating labyrinth seal which prevents dirt, oil, or water from enter-

ing the bearing housing. The motors are wound with Formex wire.

Quick-Change Holder and Adaptors for Milling and Boring Machines

Designed for use with milling and boring machines, a quick-change holder together with a complete line of adaptors



Quick-Change Holder for Milling and Boring Machines

which enable the holder to accommodate chucks for boring bars, drills, face, end, and shell mills, arbors, and so on, is now being manufactured by the Milling Machine Adaptor Corp., 1410 W. Fort St., Detroit, Mich. The design of the holder is such that adaptors can be interchanged in five seconds or less, it is claimed.

Adaptors fit into the holders with straight shanks and are held in locked position by means of keys which are set or retracted by turning a knurled collar. The adaptors together with chucks are said to hold tools so firmly that they cannot be pulled out or their position changed in any way during cutting operations, thus permitting the perform-



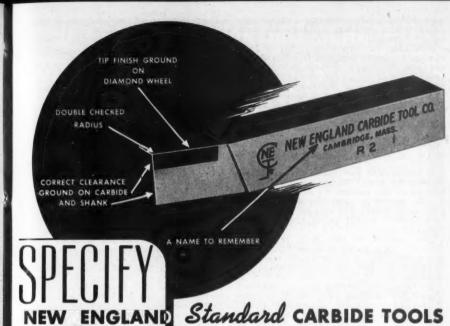


EASTERN PRECISION GAGE CO.
HERSH TOWER BLDG., BROAD ST.
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Tool Style No. 2

Tool Style No. 3

Tool Style No. 4

CHICAMO CHIMINE ROOF CO

Tool Style No. X5

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Tool Style No. X6

Styles I to 4 furnished right- or left-hand

New England Standard Carbide Tools are precision built every tool is ready for the job, because correct radii and clearances are finish ground to correct tolerances. Standard tools are supplied with "U" grade tips for cutting aluminum, cast iron, brass, bronze and non-metallics, and in "S" grade for steel.

We will be pleased to arrange delivery schedules to produce your standard or special tools with any make or grade of carbide specified by you.

NEW ENGLAND CARBIDE TOOL CO.

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TUNGSTEN CARBIDE PRODUCTS + DIAMOND TOOLS + DIAMOND POWDER



Please send me your new Standard tool folder and a Standard tool wall chart for our tool room. M.M.s.

NAME______TITLE____

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CITY______STATE___

277

ance of unusually accurate cutting operations and reducing spoilage of work to a minimum.

Available in two styles, the quickchange holder is designed to fit new and old-type milling and boring machines having spindle nose tapers as follows: Nos. 10, 11, 12, and 13 Brown & Sharpe tapers; Nos. 4, 5, 6, and 7 Morse tapers; Nos. 40 and 50 National Standard tapers.

M-B "Whirlwind" Pneumatic Grinder

A bench type pneumatic grinder to be known as the "Whirlwind" has been placed on the market by M-B Products, 130 E. Larned St., Detroit, Mich. Rigidly constructed, this unit is said to be particularly useful in lapping various types of parts.

The spindle of the M-B Whirlwind Grinder has a speed of 55,000 r.p.m. and is provided with a ½-inch diameter hole to allow for the use of a standard ½-inch diameter abrasive stick, the end of which can be dressed to any desired shape for getting into small places. Where a cone shape is used, the machine is said to be ideal for the burring

of small holes or similar burring opera-

The Whirlwind has three stages of



M-B "Whirlwind" Pneumatic Grinder

power which are obtained by means of three individual air jets that are controlled by a valve. For all normal work, one jet is said to be sufficient, however, in performing difficult operations, the second or third jet may be readily employed.

To protect the unit from water, dirt, and scale in air lines and at the same time provide for proper lubrication, a 4-inch pipe size M-B air line filter and automatic lubricator can be furnished as accessory equipment.



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July.

WHEN IT'S A...

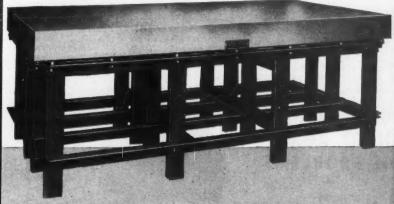
Challenge

CHALLENGE LAYOUT SURFACE PLATES help "step-up" schedules. They will perform through solid days at top speed and still be there for many years of post-war performance.

CHALLENGE LAYOUT SURFACE PLATES

SEMI-STEEL

PLANER FINISH



Built of fine-grade, special analysis semi-steel, these Plates make a true, rigid surface for layout, inspection or assembly work. Specially grooved or machined "Tee-Slot" surfaces for specific checking or assembly operations are available on order.

AVAILABLE WITH OR WITHOUT ALL-STEEL STAND

Challenge Layout Surface Plates and the all-steel, arc-welded stand give the solidity of one piece construction. Stand equipped with lock leveling screws. Surface sizes from 30"x60" to 54"x144". WRITE FOR FULL DETAILED INFORMATION.



THE CHALLENGE MACHINERY CO.

GRAND HAVEN . MICHIGAN

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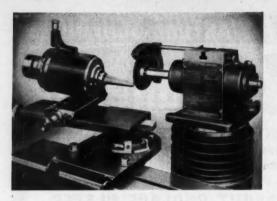
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Cincinnati No. 1 Radius Grinding Attachment

Designated as the No. 1, a radius grinding attachment which is especially designed for application to Cincinnati No. 2 cutter and tool grinders for use in grinding ball-end and diesinking cutters is announced by The Cincinnati Milling Machine Co., Cincinnati, Ohio. Other types of work, such as double-end cut-

Illustration Showing No. 1 Radius Grinding Attachment Applied to Cincinnati No. 2 Cutter and Tool Grinder

ters (straight or helical flutes) and diesinking tracer fingers, may also be ground.

The attachment includes two slides, each having longitudinal and transverse adjustment of the work with respect to the grinding wheel. The base of the attachment contains a large diameter anti-friction pivot which is arranged so that the slides may be swiveled as a unit through 360 deg. Also incorporated in the base are movable stops having screw adjustment which accurately 1 i m it the

swivel motion to the desired amount.

In addition, the Cincinnati No. 1 Radius Grinding Attachment includes an index plate at the rear of the workhead spindle having 24 notches which enables the attachment to handle straight flute cutters having 1, 2, 3, 4, 6, 8, 12, and 24 flutes without the use of a tooth rest. When grinding cutters with helical flutes, the universal tooth rest supplied with the machine may be used.

Accessory equipment available for the

"SHORT RUN" DIE PROBLEMS

SEND FOR CATALOG

It's an eye-opener on what you can do without dies, and gives details on Di-Acro Shears, Brakes, Benders.





SHEAR (Illustrated) . BRAKES . BENDERS

Use "DIE-LESS DUPLICATING" with Di-Acro Shears, Brakes, Benders. All duplicated work is accurate to .001". You'll get a new slant on "short-run" production problems from the great variety of parts which can be produced by Di-Acro Machines. Thousands of them are in use saving Man Hours and Critical Materials.

O'NEIL-IRWIN MFG. CO.

306 8th Avenue So., Minneapolis 15, Minn.

July.

SHELDON

Sheldon BBU-1240 WQ Precision Lathe

This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round), the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl head-stock. Its improved Sheldon 4-speed, V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has anti-friction bearings. It is so designed that spindle belts operate through a standard 1-piece bed. This bed is bridge-braced with heavy cross girts and has hand scraped ways—2 V-ways and 2 flat ways.

If interested in 10", 11" and 12" quality lathes be sure to see the SHELDON.

SHELDON MACHINE CO., INC., 4250 N. Knox Ave., Chicago, U. S. A.

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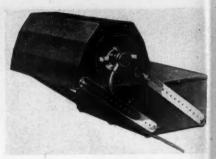
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No. 1 attachment includes a motor for grinding cylindrical parts such as tracer fingers; collets and sleeves for grinding straight shank cutters ranging from ½ to 1½-inch shank diameter; and collets for grinding taper shank cutters ranging from No. 4 to No. 11 B & S shanks.

Specifications of the Cincinnati No. 1

Specifications of the Cincinnati No. 1 Radius Grinding Attachment are as follows: capacity, 3-inch diameter ballnose cutter; taper in work spindle, No. 5 Morse; net weight, approximately 98 lb.; shipping weight, approximately 143 lb.



Gates Universal Bench Model Sodium Vapor Inspection Light

Gates Sodium Vapor Inspection Light

A lighting unit providing sodium vapor illumination, the truly monochromatic nature of which permits needlesharp focus, is announced by Geo. W. Gates & Co., Franklin Square, Long Island, N. Y. The soft yellow colored light produced by this unit is also said to reduce eye strain to a minimum.

According to the manufacturer, the Gates Sodium Vapor Inspection Light is particularly useful in inspecting work for cracks or markings; for creating interference bands in the checking of sur-

faces by means of optical gages; in the observation of twinning in quartz crystals; in the analysis of organic compounds where readings of rotation of polarized light are used; and in microphotography.

The Gates Sodium Vapor Inspection Light is made in several types, depending upon the applications for which it is intended. The accompanying illustration shows a universal bench model, the reflector of which can be swung into varicus positions.

Penrod

Centrifugal Coolant Pumps

MODEL P-10H PUMPS ARE EASILY APPLIED PENROD PUMPS GIVE BETTER SERVICE



MODEL P-10H

Model P-10H pumps use the motor feet for mounting and can be located in any position as long as the liquid will flow into the pump by gravity. This pump is easily installed on old or new machines and is ample enough to handle single or multiple installations. Model P-10H-½ will pump up to 1200 G. P. H., and Model P-10H-½ to 2400 G. P. H. Penrod pumps are conventional in style, but we have incorporated many new features such as replaceable seal assemblies, totally enclosed motors, grease sealed ball bearings, streamlined design, etc.

Some jobber districts still open

Tank built especially for Model P-10H-%. Pump can be supplied promptly. Made from heavy sheet steel and containing built-in baffle to collect chips. Lid can be removed to clean tank without disconnecting return pipe fittings. Model P-10H pumps are ready for immediate delivery. Phone or wire us for details.

Manufacturers of Machine Tool Coolant Pumps for years

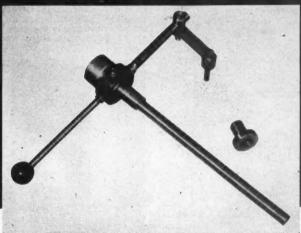
FLOYD PENROD & SONS TOOL & ENGINEERING COMPANY

1208-1216 W. 2nd Street

MUNCIE, INDIANA



Empire AUTOMATIC DRAWBAR For Atlas, Logan & So. Bend Lathes



REASONS WHY!

- 1. No holes to drill.
- 2. Gear guard remains in place.
- 3. Bearing adjustment nuts undisturbed.
- 4. Concentric-necessary for high speeds.
- 5. Good differential between open and closed.
- 6. Easy to mount—takes only 3 minutes.
- 7. All necessary parts hardened and ground.
- 8. Can be furnished for 3-AT, 1A and 3C collets.

Specify type of collet sleeve wanted.

PROMPT DELIVERY

COMPLETE \$55.00

FISHER TOOL COMPANY
226 Lafayette Street, New York

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A Combination Hard To Beat!

THE right steel — the most modern machines — and skilled craftsmen — those are the ingredients of superlative tap-making. At Threadwell, the steel is metallurgically correct. The machines are the most modern that money can buy. (The Ex-Cello thread grinder in the photo is a good example.) And at Threadwell the men have tap-making skill that is a heritage of generations of threading tool craftsmen. Your "Threadwell" distributor will give personal attention to your tap needs.

THREADWELL TAP AND DIE CO. Greenfield, Mass., U.S.A.

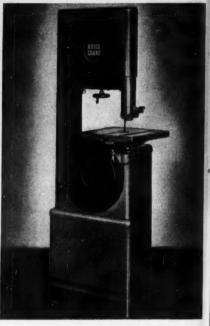
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CANADA: BRIDGE MACHINERY CO., MONTREAL ENGLAND: SKYLUX LTD., LONDON



Boice-Crane Band Sawing Machine

A powerful band sawing machine for cutting metal, wood, plastic, and paper has been introduced by the Boice-Crane Co., 937 Central Ave., Toledo, Ohio. Available in both bench and floor models, the machine is designed to cut stock up to 8% inches thick and to handle



Boice-Crane Floor Model Band Sawing Machine

work up to 27 inches in diameter. An accurate blade tension scale is included in the construction of the machine.

According to the manufacturer, the Boice-Crane Band Sawing Machine is designed to operate quietly and without vibration. The entire framework is a one-piece steel structure. The wheel guard swings on hinges and must be closed before the machine can be operated. The telescoping blade guard is held in place by friction when the lock handle is released, thus allowing for easy and safe adjusting.

The Boice-Crane Band Saw is designed for use with blades from ½ to % inch which are adjusted by a con-

Exclusive Concentration

Production

SMALL REAMERS

Sizes from 1/16" to 1/2"

ASSURES ...

Speedier Delivery of a Better Product

 Straight shanks — Straight flutes, Ground all over to accurate decimal tolerances. That's why these reamers mean smoother holes — eliminate the necessity of lapping and give such long, continuous service. The cutting edges, of tested high speed tool steel ream clean—stay keen. Built by reamer specialists to precise, exacting standards -- in a plant devoted solely to the production of small dimension reamers -- insures your getting a top quality product, at top production speed. Average deliveries in from 30 to 40 days. Available in sizes from 15" to 1/2"—special types, including hand, stepped and piloted reamers, to order. If you want finer small dimension reamers - faster -

Metal Cutting Tools and Manufacturing Company 11121 Grand River Avenue . Detroit, Michigan

Telephone HOgarth 9164

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venient single knob control. The unit is provided with eight speeds to suit every size of blade used and type of material to be sawed. The 15 x 151/2inch table of the machine is rigidly supported on large trunnions and can be tilted 45 deg. to the right and 10 deg. to the left, the degree of tilt being indi-cated by a convenient scale. All gears of the machine operate in oil, and all mechanisms are fully enclosed and sealed against dust and grime.

Kalamazoo Metal-Cutting Band Saw with Coolant System

The illustration herewith shows a metal-cutting band sawing machine that is now being introduced by the Machine Tool Division, Kalamazoo Tank & Silo Co., Kalamazoo, Mich. A feature of the machine is a coolant system which allows for unusually high speed cutting of metals and at the same time provides for long blade life.

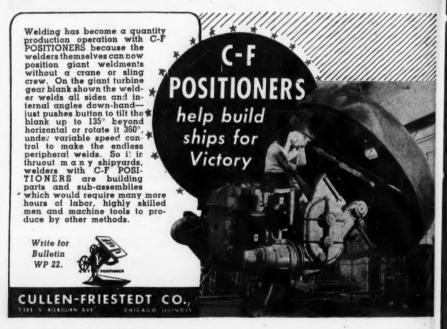
The system includes a centrifugal type coolant pump, the four-blade impeller of which is mounted on extended motor shaft. The pump is powered by a 110-120 volt, single phase, 50-60 cycle motor

which is designed for continuous operation and is completely enclosed so as not to be affected by moisture or cutting solutions. Motor bearings are Oilite bronze types with large felt oil retainers.

Coolant flow can be readily controlled from a slow drip to a fast washing action by simply turning a valve. According to the manufacturer, the control valve may be completely shut off while pump is in operation without injury to any part of the coolant system or motor. Dirt and chips are said to flow harmlessly through the system, however, a sturdy, large mesh strainer encloses the impeller assembly to collect large dirt particles, the strainer being easily removable for cleaning.

The flexible metal nozzle of the feed line permits instant focusing of coolant at any desired angle. The feed line is made of tough, flexible extruded plastic tubing that is said to be resistant to caustics, oil, and chemicals, non-kinking, and unaffected by continued flexing or temperature changes.

The Kalamazoo Metal-Cutting Band Saw is designed to cut tubes, rods, angles, heavy round or flat stock as well as odd shaped workpieces. The size and weight of the unit allow for easy mov-ing throughout a plant. The machine is



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Here's Your Guide to Lower Wheel Dressing Costs!

Of course you will want to know more about this new Tru-Line Principle of wheel dressing! The coupon below will bring you the facts about Tru-Line multiple-diamond Tools for straight, profile and step dressing operations—the tools that are amazing production men by their accuracy, their ability to speed production, and by the almost unbelievable savings in time and production costs they are accomplishing.

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Kalamazoo Metal-Cutting Band Saw with Coolant System

Saw is designed for use with blades 10 feet 5 inches long x % inch wide x 0.032 inch thick and is equipped with a 1/2 h.p. a.c. ball bearing motor. Direct current or special voltage motors can be supplied on order. The machine occupies a floor space of 25 x 65 inches and is 26 inches high from floor to top of bed. Weight, approximately 600 pounds.

Universal "Roll-In" Metal-**Cutting Band Saw**

Universal Vise & Tool Co., Parma, Mich., announces a metal-cutting band sawing machine with gravity feed, to be known as the "Roll-In." The saw blade is fed in the work through movement of the balanced blade wheel frame on an inclined track. Blade pressure is automatically regulated by the texture and degree of hardness of the metal being

provided with three speeds of 85, 110, and 160 feet per minute and has a capacity for 8-inch round and 8 x 16-inch flat work. An extra capacity model with throat for handling work up to 8 x 24 inches is also available.

The Kalamazoo Metal-Cutting Band

THE PERFECTION WIRE STRIPPER WILL SPEED UP YOUR PRODUCTION IMMEDIATELY !

- RAPID
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- EFFICIENT
- ECONOMICAL
- BUILT TO ENDURE
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THE PERFECTION WIRE STRIP-



PATENTED MODEL A

PER puts wire stripping on a production basis-Instantly and completely it removes the insulation from the ends of solid, strained or multi-conductor cable or wire, up to one half inch in diameter.

THE PERFECTION WIRE STRIPPER is a precision equipment—ruggedly built and engineered to provide years of trouble-free operation. Send now for descriptive literature on this versatile and essential instrument.

59 RUTTER STREET WEBER MACHINE CORPORATION ROCHESTER, N. Y.

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These engineers can help you quickly — at no cost or obligation

If you want to cut your degreasing costs and speed up your metal-cleaning work — if you have a difficult metal-cleaning job that's giving you trouble — get in touch with us at once! There is a lot more to solving a degreasing problem than just buying some new degreasing equipment. Our engineers travel from coast to coast working on every possible type of metal-cleaning operation. They have licked some problems that were called impossible. They are specialists in degreasing with many years of experience in that field. They will tackle any job — without a penny of cost or obligation to you — and we mean just that! Write today telling us what your problem is — and you will get quick action!

PHILLIPS MANUFACTURING COMPANY 3429 W. TOUHY AVE., CHICAGO, ILLINOIS

Phillips MANUFACTURING COMPANY

July, 1943

MODERN MACHINE SHOP

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cut, thus eliminating blade breakage due to incorrect pressure.

Readily adaptable to cut-off, trim, and contour work, the Universal Roll-In Metal-Cutting Band Saw is provided with three speeds of 81, 161, and 264 feet per minute and is designed for use with saw blades from 8 feet 6 inches to 9 feet in length and ¼, ½, and ¾ inch wide. Other specifications of the machine are as follows: height, 5 feet 2 inches; depth, 3 feet 4 inches; width, 2 feet 6 inches; work table area, 181/2 x 30 inches: distance of table from floor, 30 inches; maximum cut vertically, 7



Capacity: drills from 1/8" to 11/4". Larger holder takes drills to 21/4". Cup wheel, 6" dia. Straight face wheel, 6" x 4".

SHARP TOOLS - MORE PRODUCTION Howe & Son. Inc., Hinsdale, N. H.



Universal "Roll-In" Metal-Cutting Band Saw

inches; maximum travel of blade into work, 7 inches (by resetting work, any length cut can be made); weight, 700 pounds.

The Universal Roll-In Metal-Cutting Band Saw is supplied complete with holding block, clamping vise, and ½ h.p., 110 volt, 60 cycle, 1,725 r.p.m., a.c., sleeve bearing motor.



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 Inexperienced workers on use the NEW READING TAP GRINDER on tool and cutter grinders — surface grinders-even bench lathes.

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Large enough to successfully serve you, yet small enough to give personal attention to your needs.



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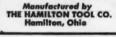
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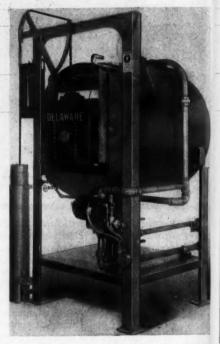
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Prompt shipment

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Delaware Controlled Atmosphere Furnace

The accompanying illustration shows a small controlled atmosphere furnace for production heat-treating operations which has been introduced by the Furnace Division, Delaware Tool Steel Corp., 3300 Market St., Wilmington, Del. The furnace, which has an effective operating temperature range of from 1,000 to 2,500 deg. F., occupies a floorspace of 34 x 36 inches, is 76 inches



Delaware Controlled Atmosphere Furnace

high, and has a shipping weight of 2,500 pounds.

The cylindrical shell of the furnace is of heavy steel plate, welded construction and is so fabricated that all internal parts subjected to high temperatures are easily accessible. That section of the shell which is exposed to high temperatures when the furnace door is in raised position consists of a plate that is constructed to eliminate all possibility of warpage and is easily removed to permit repairs to door face brick.

Ju

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MODEL CE Immersion Type

◆ One of a complete line of pumps for all machining operations. ◆ Built for twenty-four hours a day service. ◆ Instantaneous coolant delivery, self-priming, never becomes airbound. ◆ Does not build up pressure at slow speeds. ◆ Unharmed by abrasives in liquid—or by running dry. ◆ Built by one of the country's largest pump manufacturers.

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July, 1943

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MODERN MACHINE SHOP

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The burner of the Delaware Controlled Atmosphere Furnace is designed for use with low or high pressure gas, working equally well when either artificial, natural, or propane gas is used as fuel. The burner jet or nozzle carrying the gasair mixture to the furnace is seated in a heavy Mullite tunnel. As the gas-air mixture emerges from the tunnel tile it expands and enters a flame block, emerging as a flat ribbon of flame from which the muffle derives its uniform heat

The furnace door is arranged for raising and lowering by either a foot pedal or hand control. Take-up adjustments permit constant maintenance of tight seal between door lining and face tiles, which are constructed of Mullite and keyed into position for permanence. The combustion chamber tile is also made of Mullite and is said to be serviceable at all operating temperatures up to 3,300 deg. Fahrenheit.

The Delaware Controlled Atmosphere, Furnace is carefully insulated so as to hold heat losses to a minimum. Insulation consists of 4½-inch high temperature insulation backed by 2-inch high quality low temperature insulation.

The hearth tile of the furnace is in-

stantly replaceable while furnace is at full temperature. According to the manufacturer, the design of the furnace is such that it is impossible for the hearth tile to reach a temperature higher or lower than that set for the heattreating operation, also for the hearth tile to have hot spots.

The baffle of the furnace is composed of five sections—four sections of Mullite and a baffle plate made of nickel alloy steel. The muffle is constructed of silicon carbide and is rounded at the corners to relieve strains. The muffle can be readily removed for replacement through door opening, no masonry work being required to install new muffle. Unlimited room for expansion or contraction of muffle and hearth tile is allowed for in the construction of the furnace.

Improved Five Station Lathe Turret

Improvements in the design of its five station lathe turret described on Page 258 of the August 1942 issue of MODERN MACHINE SHOP are announced by the Automatic Machine & Tool Co., 132 Charles St., Auburndale, Mass. Fea-



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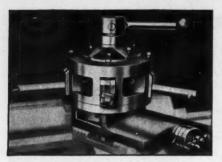


Grinding Obstinate Steel Alloys

Super charger impellor shaft for Wright Cyclone Aircraft Engine is finish ground with the aid of ECONOMY GRINDING OIL (1654).

ECONOMY GRINDING OIL (1654) is a development to meet very severe grinding conditions incident to removal of stock from steels and alloys of peculiarly obstinate structure. Even where it has been necessary to greatly increase usually recommended feeds and speeds this oil is successful.

HEWHITE & BAGLEY COMPANY Chicago Detroit Minneapolis



Automatic Machine & Tool Improved Five Station Lathe Turret

ture of the improved turret is a crown clutch arrangement which permits the turret head to be indexed to any one of 10 positions by simply turning the handle at top of head ½ inch and lifting to 45-deg. angle. This construction is not only said to eliminate the need for manual lifting of a pin for indexing turret but to also enable the turret to be readily rotated and tilted to the desired position, thus providing for exact tool settings and correct cutting efficiency.

The improved five station lathe turret

is available in four sizes for use on all lathes with swing from 9 to 30 inches.

Wickman No. 1 Swiss-Type High Speed Precision Automatic

Designated as the No. 1, a Swiss-type high speed precision automatic lathe especially designed for the manufacture of extremely small, slender parts requiring precision limits and fine finish has been introduced by The Wickman Corp., 15533 Woodrow Wilson Ave., Detroit, Mich. The machine is said to be particularly adaptable to the production of firing pins, fuse parts, clock, watch, meter, and aircraft instruments components, and other long slender pieces.

The Wickman No. 1 Automatic has a fig-inch diameter bar capacity and maximum turning length of 1th inches. The unit is provided with spindle speeds ranging from 1,500 to 12,000 r.p.m. and machining cycles of from two seconds to five minutes. The high spindle speeds together with the unusually rigid design of the machine allow for the efficient use of tungsten carbide cutting tools.

According to the manufacturers, small precision parts, regardless of whether



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sults. These heavy demands make it difficult to fill all orders. See your supplier—he'll do his best to help.

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July, 1943

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MODERN MACHINE SHOP

they have pivot points, back shoulders. multiple diameters, tapers, bevels, and so on, can be produced on the Wickman No. 1 Automatic in one operation to limits of ± 0.0002 inch on diameter and concentricity.

In operation, the bar stock is fed from the headstock of the machine through a guide bushing in the toolhead in such a manner as to enable it to be accurately machined by five radially fed tools. Both the headstock carrying the bar stock and tools performing the cutting operations are controlled by cams.

The slides on which the cutting tools



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ZEH & HAHNEMANN GO. 184 VANDERPOOL ST., NEWARK, N. J.



Wickman No. 1 Swiss-Type High Speed Precision Automatic

are mounted are made of hardened steel that is lapped to very close limits, and are provided with micrometer adjustment both radially and parallel to the axis of the work. The toolhead is of extremely rigid design to afford proper support for the guide bushing and five cam-operated tool slides. A quick-operating clamping device on each slide facilitates tool change.

The spindle of the Wickman No. 1 Automatic is made of nitrided alloy steel

. for more than 1001 odd jobs



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1 eel which is accurately finished, and is mounted in a well proportioned headstock casting. The front end of the spindle is located in a special bronze bearing of the adjustable type which is journal lapped to closest possible running limits. The rear end of the spindle is supported in specially selected precision preloaded double-row ball bearings which absorb thrust load of spindle. This type of construction is said to reduce radial and lateral spindle deflection to a minimum.

Attachments for performing drilling, chamfering, counterboring, tapping,

threading, and slotting operations can be furnished with the machine on order.

Challenge Surface Plate Stand

An all-steel arc welded surface plate stand which is equipped with wheels to allow for easy moving from one plant





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Challenge Surface Plate Stand

location to another has been developed by The Challenge Machinery Co., Grand Haven, Mich. The stand is available in three standard sizes to accommodate 18

REYNOLDS Coolant Systems for Machine Tools



No. 1-\$ (Right) — Approximately 7 gal. p.m. capacity; 16" x 10" x 11" tank. 1/4 H.P. motor. For Milling and Screw Machines, lathes, etc. \$98.50 each for 110 volt, 1 phase model, and 220 volt, 3 phase model. \$50 volt, 3 phase model—\$108.50.

No. 206 (Left)—Approximately 15 gal. p.m. capacity. Tank 20" x 16" x 16". 1/4 H.P. motor. For grinding machines, multiple spindle drills. \$95.00 for the 110 volt, 1 phase model, and 220 volt, 3 phase model. \$112.00 for the 550 volt, 3 phase model.

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How Better Design makes for Better TAPPING

Every item in the Procunier line of tapping equipment has been skillfully designed so as to produce definitely faster, more accurate tapping with less tap breakage!

Procunier Universal Tapping Machines

offer: 1. Four speeds, ranging from 390 to 2050 RPM efficiently handle jobs for which conventional high speed tapping machines are inadequate. 2. One machine handles tap sizes from No. 2 to ½" through two interchangeable heads. 3. Extra long Spiral Compensating Springs conveniently located, with wide range hand screw adjustments, maintain preset cap feeding and reversing pressure INDEPENDENT OF

OPERATOR. In addition these machines are so designed that they actually allow the tap to establish its own lead.

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Tap is driven by a double-cone, cork-faced friction clutch which automatically regulates tap driving power by pressure applied through the drill press spindle. Operators can quickly detect dull or loaded taps by the "feel" or pressure on the clutch. Many other special fea-

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Procunier Tru-Grip Tap Holders

are the lightest on the market—one-third the weight of conventional tap holders. Tap has positive drive through the square hole broached in the collet. The tap is held in true alignment by the round of its shank, and tap shanks are never scored or disfigured. Other features include: Wide range of tap capacity; one piece body and shank; accepts standard size taps.

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Send coupon for illustrated bulletins giving full details and prices on Procunier Universal Tapping Machines, High Speed Tapping Head and Tru-Grip Tap Holder.

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Cross section of

Tru-Grip Tap Holder showing

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x 24, 24 x 24, and 24 x 36-inch Challenge surface plates. The stand can also be made to order to accommodate many types of surface plates other than Challenge plates. In addition, the stand can be obtained without wheels where stationary installation is desired.

Di-Acro Improved Shear No. 2

The O'Neil-Irwin Mfg. Co., 306 S. 8th Ave., Minneapolis, Minn., announces that the Di-Acro Shear No. 2 described on Page 240 of the January, 1943, issue

NO Hand - Finishing

HAM" Sub-Presses



10 diameters of plungers up to 6".

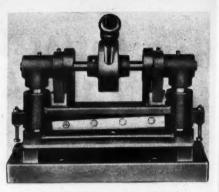
Arch type for strip punching. Overhang type for second operation work.

Alignment is attained and maintained which lowers costs through savings in time and effort. Send samples or drawings for estimate. Booklet explains how and when Sub - Presses should be used.

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Waltham Machine Works

WALTHAM, MASS.



Di-Acro Improved Shear No. 2

of MODERN MACHINE SHOP has been Improvements include inimproved. creased net weight and the extension of mechanical strength limits, thus providing for greater rigidity and ease of operation and permitting higher mate-rial output. All other features of flexibility, wide operating range, and so on, found in the previously announced shear are incorporated in the improved unit. Net weight of improved shear,

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 Bronze brushed journal bearings
 Standard stroke of 6" a Automatic
stop a Gravity feed with adjustable
pressure blocks by Hydraulic lift on
back stroke a Standardized construction a Accessibility to all parts a few adjustments.

Robertson ECONOMY Power Hack Saws are in use throughout the world—more than 30,000 have been installed. Make your next power hack saw a Robertson ECONOMY for speed and accuracy.

Robertson builds a complete line of Power Hack Saws in sizes and types to suit your needs. Send for illus-trated folder Form 1-A which gives complete details.

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BUFFALO, N.

Sentry Size No. 4B Model "YP" Electric Vertical High Speed Steel Hardening Furnace

The Sentry Co., Foxboro, Mass., announces the addition of the Size No. 4B Model "YP" furnace illustrated herewith to its line of electric vertical high speed steel hardening furnaces. The

JOHNSON'S



Adjustable Limit SNAP GAGES

MODEL A





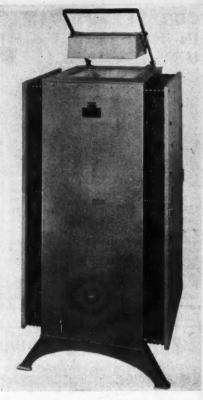
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W. E. JOHNSON CO., Little Falls, N. J.



Sentry Size No. 4B Model "YP" Electric Vertical High Speed Steel Hardening Furnace

furnace is designed to accommodate tools up to 4% inches in diameter and up to 36 inches long.

The furnace shell is made of steel with

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July, 19



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Capacity: No. 47-W Abrasaw—Solids up to 1" tubing and light sections up to "diameter. Size of Discs: Up to 12" diameter. 1/16" to 1/8" thick.

Capacity: No. 48-W Abrasaw—Solids up to 21/2"—tubing and light sections up to 3½" diameter. Size of Discs: Up to 16" diameter, 1/16" to 1/8" thick.

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BRIDGEPORT

Safety Emery Wheel Co., Inc. 1297 W. BROAD ST. BRIDGEPORT, CONN

heavy top and bottom plates. Amply insulated, the furnace is said to attain a top temperature of 2,500 deg. F. Heating elements are Globars, properly spaced on both sides of the muffle to provide even heating. The full muffle chamber is constructed of silicon carbide, with inside dimensions of 6 x 6 x 40 inches in depth, and is readily remov-able. The lift-type door is so arranged as to swing up and back away from the muffle opening, and is balanced so that the hot surface is not exposed to the operator. Terminals are spring mounted and designed for efficient air cooling. All electrical contacts are shielded and provided with safety guards.

Yoder Roll Grinding Machine

A roll grinding machine which is designed to accommodate work up to 16 inches in diameter x 20 inches long is now being manufactured by The Yoder Co., 5500 Walworth Ave., Cleveland, Ohio. The machine is provided with manually synchronized table and cross feeds, the table feed having two speeds, and is equipped with a drive which is designed to operate the workhead at



Yoder Roll Grinding Machine

nine speeds without belt or gear change. Other features of the machine include a precision-built high speed spindle and centralized controls for convenience of operation.



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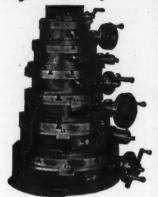
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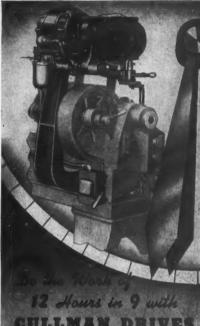
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CULLMAN DRIVE

With the ever-increasing demand for laster delivery it is vitally important to get maximum production from every machine and man-hour.

Cullman Drives will modernize shalt and belt driven lathes, screw machines, shapers, and similar equipment to give an increased

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Cullman Drives give individual machine control, have greater flexibility, and are safer in operation than overhead line shaft drives. They permit the itmost in efficient arrangement for work flow and lighting. Cullman Drives are surely and built for long life. They operate with belt-drive smoothness. They are easy to install and soonomical to buy. They are built for motors from ¼ to 15 H.P. Prompt delivery can be studied as a secondaria.

be made on most sizes.

Write for full information on Cullman Drives and the 60 day trial plan.

CULLMAN WHEEL COMPANY 1352-V Altgeld St., Chicago, III

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Type N Roto-Clone Bench

The Type N Roto-Clone Bench developed by the Dust Control Division, American Air Filter Co., Inc., 100 Central Ave., Louisville, Ky., is said to

afford utmost safety in the burring, filing, and flexible shaft grinding of magnesium. The design provides a semi-enclosed bench assembly with down draft ventilation through wood grilles and complete with tool shelf, fluorescent lights, and partitions between stations.

The Type N Roto-Clone is also available in small individual units which can be located directly in back of magnesium grinding stands. Inlets are placed so that exhaust ducts are short and run directly into collectors. According to the manufacturer, Type N Roto-Clone Units have also proved effective in the collection of fibrous, and often greasy, dust from buffing wheels.

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July, 194

An outstanding feature claimed for the Type N Roto-Clone is the elimination of all restrictions, ledges, or recesses where damp magnesium dust could be deposited. The magnesium dust is precipitated and stored under water. Accord-



VERTICAL SHAPERS 8"-12"-14" STROKES

Four cutting Speeds . . . infinite feed variations quickly selected . . . Directional control for all movements . . . Rapid power movements in all directions . . . Brake for Ram automatically applied...OPERATOR CONTROLS MACHINE WITHOUT MOVING FROM HIS WORKING POSI-TION . . . Timken Bearings for Bull Gear, Shaft and Rotary Toble . . . ACCURATE, POWERFUL.

Circular No. 728A



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July, 1943

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TYPE A-STEP JAW DESIGN

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pidEspecially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

Size No.	Range of Bores Taken	Net Price
14	1/2" to 1"	\$12.00
2A	1" to 11/4"	16.00
3A	11/2" to 2"	23.00
4A	2" to 3"	34.00
5A	3" to 4"	40.00

(Other Sizes Taking Up to 7" Bores) Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Write for bulletin.



TYPE B-STRAIGHT JAW DESIGN

Adapted for work with both short and long bores.

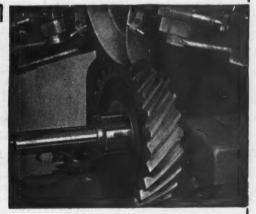
Size No.	Range of Bores Taken	Net Price	
1X	1/2" to 12"	\$10.00	
	" to 21/32"	11.00	
2X 3X	21/32" to 3/4"	12.00	
00	3/4" to 7/6"	14.00	
0	7/4" to 1"	16.00	
1	1" to 11/4"	18.00	
2	11/4" to 1 1/4"	21.00	
3	1 7 to 2"	29.00	
4	2" to 21/2"	40.00	

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Interchange — Quiet

We machine your blanks or cut from bar stock. We cut and grind gears on Maag Machines in our Jersey City Plant to an Accuracy of Profile up to .00012"; of Pitch up to .00024" and concentricity of Pitch Circle, within .0060". Gears cut to usual standards without grinding. (We do not make warm or boval gears.)



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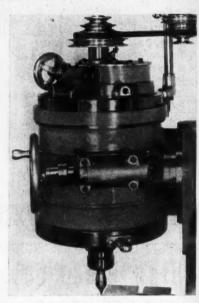
ing to the manufacturer, no magnesium particles can pass to drain, since any overflow consists only of excess makeup water that might be required to maintain the proper liquid level. Any hydrogen resulting from the reaction of magnesium and water is said to be automatically vented whether fan is stopped or in operation.

The Type N Roto-Clone Benches and Units are made in a wide range of sizes with capacities from 1,000 to 20,000 c.f.m. The benches are available in types with one to three work stations on the same side or with one to three sta-

tions on both sides, back-to-back.

Matthew Rotary Tool Carrier

Designated as the Matthew Rotary Tool Carrier, a vertical milling attachment, the design of which is said to



Matthew Rotary Tool Carrier

make possible the complete milling of a workpiece without changing the setting of the piece on the machine table, is now being offered by the Production Machinery Development Co., 4845 St. Aubin Ave., Detroit, Mich. A feature



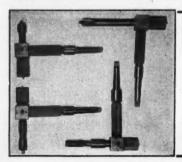
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for big-wheel Carbide Tool, Surface and Disc Grinders, Sanders, Cut-Offs -Gets all the dust. Quickly installed. GE 11/2 hp continuous duty motor sends dirty air through cyclone separator, returns cleaned air through filter to working space. Write for Bulletins.

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of the attachment is the tool carrying spindle which has two available movements—a direct lever movement for quick milling and a worm and wheel movement for slow, heavy milling. For straight-line cutting, the spindle can be solidly locked in any desired position.

solidly locked in any desired position.

The Matthew Rotary Tool Carrier consists of three main bodies which are well ribbed and made of fine grain iron that is heat treated to ensure long-lasting accuracy under the most severe service. Bearing surfaces are extremely long and are carefully scraped to provide for easy operation and unusual ac-

curacy. Alemite fittings are furnished throughout the design of the attachment

The Matthew Rotary Tool Carrier can be swiveled within an arc of 180 deg. and can be readily adapted to any make of horizontal milling machine, a plate being supplied with the attachment for fitting to machine. For standard duty, the attachment is recommended for use with a ½ h.p. 1,725 r.p.m. motor providing spindle speeds of 600, 1,000, 1,600, and 2,800 r.p.m. For grinding operations, a two-speed motor—1,725 and 3,450 r.p.m.—is recommended for use with the attachment. The design of the unit includes a patented motor drive arrangement that is said to assure even belt tension regardless of how far spindle assembly is rotated.



The accompanying illustration shows a unique diamond abrasive blade for the rapid cutting of chipbreaker grooves, shaping and form grinding of carbide tips, to be known as the "Di-Met" Chipbreaker, which has been developed by



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Single End—Double End Plugs
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Split Adjustable or Solid Ring Gauges.

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Sizes of rings from %" to 8" I.D.



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GRAHAM MULTI-PURPOSE VISE

In sizes for light drilling to heavy-duty planer and shaper jobs, this vise serves a variety of uses on a variety of machines. Attachments permit use for repeat-operation pesitioning instead of special jigs or fixtures.

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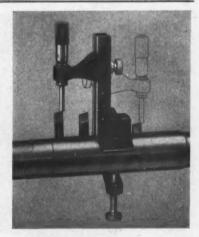
For fast, accurate setting of close-spaced boring tools . . .

BARTELT MODEL "B" PEDESTAL MICROMETER

formerly called Bartelt Tool Setting Gage

By reducing the length of the base and by providing slides on both sides of the pedestal, the usefulness of the Bartelt Pedestal Micrometer has been greatly increased with this brand new Model "B." As the illustration shows, tools placed 3½" apart can be adjusted in one setting of the gage, by simply changing the micrometer support arm from one side of the pedestal to the other. Also, the shorter base permits attachment to a bar on which the space between tools is as little as 2". This gage will speed up boring work because it greatly reduces the time necessary to get an accurate setting of the cutting tools. As with other models, the base has both flat and vee surfaces so that the Pedestal Micrometer may also be used for a depth gage, a height gage, for inspection, for machine setups, and many other purposes. Three clamps are furnished with the gage, to fit all boring bars from 1" to 5" diameter.

WRITE FOR CIRCULARS



BARTELT ENGINEERING COMPANY

1216 Partridge Ave.

BELOIT, WIS.

the Felker Mfg. Co., Torrance, Cal. The resinoid rim containing the diamonds is bonded to a laminated linen core, the



Felker "Di-Met" Diamond Abrasive Chipbreaker

laminations being interlaid with a resinous compound and baked under high pressure to form a tough, rigid composition.

While unusually strong, the core is also said to possess a high degree of

elasticity, the core acting as a cushion which absorbs shock and sudden impact and reduces chipping of blade rim. The resiliency of the core is also said to provide the blade with an unusually smooth, soft cutting action. Diamonds are closely graded for size—a feature which is said to assure a maximum number of cutting edges per inch and provide for fast cutting.

vide for fast cutting.

The Felker Di-Met Diamond Abrasive Chipbreaker is made in diameters of 3, 4, and 6 inches with ½-inch rim thickness. Similar blades of thinner construction are available for performing cut-off operations on carbide inserts. The Di-Met Chipbreaker is specifically designed for use with a coolant, preferably with a sufficient amount of water to flood the blade during cutting operations.

Hydraulic Machinery Model K Series Hydraulic Press

Designated as the Model K Series, a hydraulic press which is built in 25, 75, and 100-ton sizes and may be adapted to capacities up to 150 tons is announced by Hydraulic Machinery, Inc., 12825 Ford





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Designed for intricate contour and profile grinding in tool and die work, its great capacity for this type of grinding is being successfully applied to production in building tanks, aircraft, and other heavy munitions.

The model shown above is a truly versatile machine tool with two grinding spindles, each operating at 10,000 R.P.M. This high speed assures highly satisfactory work on any profile work likely to be encountered in tool and die making and in production. It is a machine tool that can soon pay for itself in time saved.

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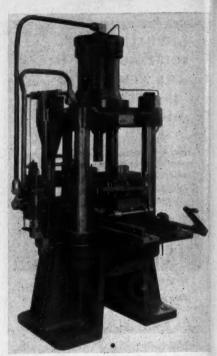
BOYAR-SCHULTZ CORP.

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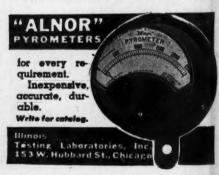






Hydraulic Machinery Model K 75 Hydraulic Press

Rd., Dearborn, Mich. The press is operated by a motor-driven power unit that may be installed in any desired location, and is manually controlled by a four-way valve which automatically cuts off power when a predetermined pressure or tonnage is reached. The frame of the press is made of heavy castings bolted together by steel tie rods,



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PLAIN TOOL AND CUTTER GRINDER

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These machines are not excelled for grinding in the machine shop or toolroom.

When provided with various attachments, they will handle practically any grinding operation including straight and taper arbors, keys, gauges, sides and ends of reamers, milling cutters, taps, drills, countersinks and counterbores. They represent a good investment and will soon pay for themselves on many grinding operations.



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A MPLE capacity for a wide range of operations . . . ruggedness to withstand today's speeds and feeds . . . and features usually found only on more expensive units . . . enable the Lewis Bench Mill and Lewis 10" Metal Shaper to efficiently handle the smaller jobs in tool room or on production line!

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These tools are supplied in semi-finished form — at unusually low cost. All planing, milling, gear cutting, etc., are complete, and only simple lathe, drill press and hand finishing are required. Everything needed for completion is furnished — semi - machined castings, parts and detailed blueprints.

Hundreds of these economical machine tools are now serving on the war production front. Deliveries are prompt... priority requirements are

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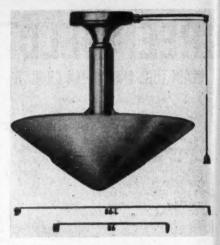
tically at the top of the machine.

The Model K 75 press illustrated herewith is designed to exert a maximum pressure of 75 tons, has a stroke of 9 inches and maximum daylight opening of 24½ inches. The machine is approximately 82 inches high overall, occupies a floor space of 25 x 50 inches, and is provided with a 19 x 134-inch platen which is located 27 inches from the floor.

McGill Extension Arm for Lighting **Fixtures**

To eliminate the constant rubbing of lamp cords against reflectors, shades, and bowls, thereby causing needless wear, expense, and hazard of swaying and broken fixtures, the McGill Mfg. Co., Inc., 1500 N. Lafayette St., Valparaiso, Ind., has developed an extension arm of the type shown in the accompanying illustration.

The arm is available in two sizes -Nos. 86 and 86-L-which are designed to fit over the Levolier switch levers of the new steel lever 41-B, 1010, and 1039 plastic shell switches. The pull cord of switch to which arm is fitted is threaded



Fixture Equipped with McGill Extension Arm

through the end hole or loop of the extension arm and fastened to the chain on the switch lever, as shown in the illustration. As a result of this arrangement, the fixture can be readily turned



ers in setting dies. No wrench needed. Six hardened screws nested in holder (see below). Uniform height hex base to point, insuring clear uniform indentations.

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1/2"

PRICES Per Set

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3/16" ...

1/4"

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CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metalworking applications.

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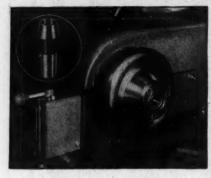
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on and off without interference from the shade or basin.

"Speedichuk" and "Bren" Collet

Lathes which have normal collet capacities of ½ inch can now be made to handle stock up to ¾ inch in diameter through the addition of the "Speedichuk" an uniquely designed "Bren" Collet offered by General Die-Stamping-Tool Co., 265 Canal St., New York, N. Y. This equipment is adaptable to any lathe with a 11/2-inch x 8 thread spindle nose

and having a No. 3 Morse taper on the inside of spindle. It can also be used on milling machines or drill presses for



"Speedichuk" and "Bren" Collet

MILLING - DRILLING - BORING ATTACHMENT

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Uses many types of cutters on a wide range of work. 1/16" to "4" end mills.

FEATURES

Large size spindle with No. 9 BeS Taper. Large quill diameter with a travel of 4". Furnished with 1/2 h.p. motor.

motor.
The aluminum pulleys provide a range of six speeds, from 250 to spindle takes 1/16" to \(\frac{4}{3} \) end mills. Quill is counterbalanced and hardened and ground. Overarm brackets equipped with spreader spread for easy mounting. spreader screw for easy mounting.

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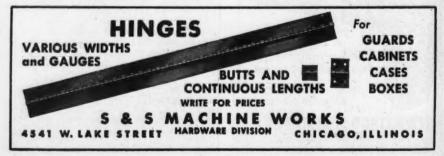
accurate chucking work.

The Speedichuk, which can be quickly fitted to lathe without the use of an adapter plate, features a floating closing sleeve that compensates for wear and misalignment of lathe spindle. A 6-inch handwheel assures a maximum



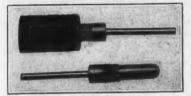
Equip your drilling department with SHUR GRIPS and reduce non-productive time—hold all shapes securely—fast and convenient—hardened jaws 5" wide open 5". Send for details.

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Straight - cut knurls make many patterns







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By angular adjustment, the Graham Knurl Holder produces a wide variety of knurlings



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Sizes 12", 14", 16", 18", 20" and 24" wheels. Ask for Descriptive Circular MUMMERT-DIXON CO.
120 Philadelphia St.

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gripping pressure on collet with minimum effort, and the heavy construction of the chuck provides for rigidity.

The Bren Collet is designed to allow use of full capacity through spindle and is closed by squeeze action, thus avoiding longitudinal movement.

P&H A.C. Arc Welders

Harnischfeger Corp., Welder Division, 4400 W. National Ave., Milwaukee, Wis., announces the addition of seven heavy



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P&H A.C. Arc Welder

have every advantage No extra men needed to steady— Reomy platform for men and tests. Great strength, lightweight. Guard rails on platform— Automatic locking. Folds compactly

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DAYTON SAFETY LADDERS

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duty and four intermittent duty model a.c. arc welders to its line of P&H welding equipment. These units feature re-cently adopted "WSR" (Welding Service Range) ratings which indicate the minimum to maximum output of usable welding current.

Specific WSR ratings of the heavy duty models are 50 to 270, 60 to 375, 90 to 500, 100 to 625, 125 to 750, 150 to 900, and 200 to 1,200 amperes. Intermittent duty model ratings are 20 to 185, 20 to 235, 20 to 285, and 20 to 335 amperes. Setting and control or current throughout the complete welding service range of each unit involves one simple easy-tomake adjustment which is said to be creep-proof.



Longer Service from Taps and Reamers

Many a tap or reamer is scrapped long before it is worn out because it is blamed for poor performance—often not the fault of the tool itself.

You'll be surprised how frequently the real trouble can be traced directly to spindle misalignment. This, however, can be easily corrected by simply using a Ziegler Floating Tool Holder which is so designed that it automatically compensates for such misalignment. Get one and see for yourself.



W. M. Ziegler Tool Co.



1924 TWELFTH ST. DETROIT, MICH.



MASTERDRIVES for PLANERS



Eliminates Lineshafting

Now you can have added flexibility in plant layout, because Masterdrive eliminates lineshafting and permits placing planers wherever you wish.

The drive is supported by four supports. Each of these require the drilling and tapping of four holes. Once supports and horizontal bars are in place, motor base and outboard bearing support can be moved laterally to line up with pulleys. Your present ceiling lineshaft pulleys are used on the motor counter shaft.

A single complete installation with Masterdrive — one responsibility. Write today for details of planer or other Masterdrive applications.



MASTER ELECTRIC CO.
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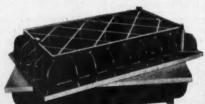
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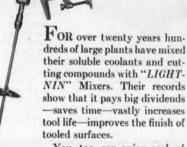
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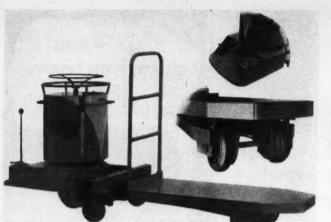
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NEW BOOKS

Shop Mathematics and Shop Theory. By John M. Amiss, G. Keith Shurtleff, and Hughitt G. Moltzau. Published by Harper & Brothers, 49 E. 33rd St., New York, N. Y. 360 pages. Cloth binding, semi-flexible covers. Price, \$1.60.

Especially prepared for use as a text with any of the standard handbooks, this book includes material which is the result of frequent revisions of material concerning shop mathematics and shop theory used by one of the authors in

teaching these subjects to apprentices and others during the past 23 years. The design of the book is such, however, that the use of a handbook in studying or teaching the text is not absolutely required but is strongly recommended.

Illustrated with photographs, sketches, and so on, the book is divided into two parts, the first of which deals with shop mathematics and the second with machine shep theory. Under Part I are sections headed as follows: Preliminary Mathematical Processes; Logarithms; Mensuration; Geometry; Trigonometry; Application of Shop Mathematics; Blue-

print Problems.

Under Part II are the following sections: Safety and Fire Protection; Manufacturing Methods; Gages and Measuring Instruments; Cutting Tools; Composition and Heat Treatment of Cutting Tools; Gearing; Machine Tools; Handbook Projects; Special Subjects (A. Superfinish, B. Oilite Bearings, C. Plastics). An appendix of Chrysler engineering standards and index are included at the rear of the book.



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J. R. REICH MFG. CO. 45 E. Stroop Rd. Bayton, Ohio Practical Algebra. By John H. Wolfe, W. F. Mueller and S. D. Mullikin. Published by the McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York, N. Y. 314 pages. Cloth binding, board covers. Price, \$2.20.

A complete home-study course in practical algebra, this book is designed to provide shop men and apprentices with the information they need to solve problems arising in their work. Both the approach of the book and the material included therein were determined by problems occurring in the various departments of the Ford Motor Company.

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Capewell Metal-Cutting Saw Blades. The Capewell Mfg. Co., Hartford, Conn., now has available a 20-page booklet containing information of especial value to users of metal-cutting saw blades. Included are tips for obtaining longer use from power hack saw blades, hand blades, and band saw blades. Illustrations are provided to facilitate instructions. Charts show tooth requirements and cutting speeds for various metals, and blade sizes for various machines. Copy of Booklet No. M339D free upon request.



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OTC Pulling System. The Owatonna Tool Co., 357 Cedar Street, Owatonna, Minn., is now issuing a bulletin which explains and illustrates approved methods for removing and replacing gears, sheaves, wheels. pulleys, bearings. couplings, shafts, and other closely fit-ted parts. The bulletin describes the ted parts. OTC Pulling System comprising OTC Grip-o-Matic Pullers and OTC Push-Pullers, their adapters and attachments, and is fully illustrated with photographs and line drawings. Copy of Bulletin No. PE-1943 free upon request.

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"Airco Comparative Index of Welding Electrodes" is the title of a four-page bulletin published by Air Reduction Company, featuring a chart that gives principal AWS and ASTM electrode classifications and indicates which electrodes produced by 20 leading manufacturers meet the different requirements. Use of this chart not only enables an individual to determine what brands of electrodes fall within a specified AWS and ASTM category, but to also learn what alternate brands might be used successfully should a specified electrode not be available.

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free of charge by writing to the Editor, W. H. Nichols & Sons, Waltham, Mass., or to Nichols-Morris Corp., 50 Church St., New York, New York.

"Mitchelite" Fluorescent Fixture Catalog No. 400. To introduce its new allpurpose "Mitchelite" line of fluorescent fixtures for war industries, the Mitchell Mfg. Co., 2525 N. Clybourn Ave., Chicago, Ill., has published a comprehensive eight-page two-color catalog designated as the No. 400. The catalog illustrates and explains all the features of these fixtures and gives details and prices on the four models available. Photographic illustrations also show how each model fixture can be used for both individual and continuous row lighting and how accessories provide for every method of mounting or hanging to fit lighting situations in the factory, office, or drafting room. Graphs, tables, and charts throughout the catalog help solve lighting problems and simplify the selection of the proper fixtures for each job. Copy of Catalog No. 400 free.

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Bond Stock Gears, Speed Reducers, and Industrial Equipment is the subject of a 184-page pocket-size catalog published by the Charles Bond Co., 617 Arch St., Philadelphia, Pa. The catalog includes illustrated, descriptive, and tabular information on miter, spur, bevel, change, and spiral gears, worms, pin-ions, sprockets, vertical and horizontal speed reducers, flexible insulated couplings, steel and iron grooved pulleys, sheaves, bushings, radial, thrust, and annular ball bearings, truck casters, bench legs, variable speed control units, and so on. Copy of Catalog No. 59-A free upon request.

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GRAY, Originator of First Practical Metal Cutter or Nibbler

Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

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THE GAMMONS-HOAGLUND CO. CONNECTION

South Bend 141/2-Inch Lathes. eight-page catalog illustrating and describing South Bend 14½-Inch Toolroom and Engine Lathes, including their various construction features, is announced by the South Bend Lathe Works, South Bend, Ind. A full page of tabulated specifications gives essential information on capacities, feeds, speeds, and dimensions of the lathes. Attachments, accessories, and tools for use with these lathes are also listed. Copy of Catalog No. 14-C free upon request.

"Cutting Fluids" is the title of a 20-page catalog issued by Tide Water Associated Oil Co., 17 Battery Place, New York, N. Y. containing illustrated sections devoted to types of cutting operations, functions of cutting fluids, selection and application of cutting oils, soluble oil emulsions, and cutting tools. The catalog also features a section which describes the various Tycol Cutting Oils and includes recommendations for their use in performing various cut-ting operations. In addition, the catalog contains information on the S.A.E. steel numbering system, chemical composi-tion charts, and a machinability index. Copy free upon request.

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TAMMS LAYOUT DOPE Now offered in Blue, Black, Orange, Red! Speeds layout on all metals. Clean, accurate detail.
Oil resistant. Won't chip, crack or flake off. Also ideal as a marking dye. Comes in 8 oz. brush-in cans, pts., qts., gals., drums. SAMPLE FREE!
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STERLING LATHE TURRETS



71/2" Square Steel Lathe Turret Bodies, fully machined, with handle and four forged steel wedges, less base.

Price: \$40.00 each, shipping weight 70 lbs. Immediate delivery from stock.

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July, 19

"ALL-WAY" LEVEL



The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES
5½" x 12" 3½" x 6"
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The United States Drill Head Co.

CINCINNATI, OHIO

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Industry prefers the serviceability of high speed steel in hand hack saw blades. The purchase price is higher but the utility of the blades makes them economical provided—Premature breakage can be avoided! The SUPER-STERLING Flexible meets the challenge. It's the High Speed Steel hand blade that won't break in use. It's guaranteed shatter-proof.

Specify Super-Sterling, Your Mill Supply Distributor will be glad to demonstrate it for you, or write Dept. B.

DIAMOND SAW WORKS, INC.

BUFFALO, N. Y.

"Inspiration for the Folks Back Home." In response to numerous requests for copies of the weekly war production posters used in the New Departure plants, New Departure, Division General Motors Corp., Bristol, Conn., has prepared a 12-page booklet featuring miniature reproductions of these 24 x 36-inch posters. Each poster contains a picture of a former employee of New Departure now in the armed forces together with a message from the particular individual shown relative to war production. Copy of booklet "Inspiration for the Folks Back Home" free upon request.



Adjustable to fit various size lathes. (Bushings are turnished with each boring bar.) Everede Holders keep the boring bar in a horizontal position, regardless of any change in the size of the lathe, within limits. • The No. 1 Holder for lathes from 7" swing to 9". • The No. 2 Holder for lathes from 8" swing to 12", and the No. 3 Holder on engine lathes from 12" swing to 24".

WILLIS STUTSON ASSOCIATES

"Taccalin Fluid Gold" is the title of a four-page folder prepared by the Taccalin Chemical Corp., 46 Vernon Blvd., Long Island City, N. Y., describing the properties, use, available forms, and so on, of Taccalin Double Grip Belt Treatment. Copy free upon request.

Planetary Milling Catalogs. Available without charge to production executives addressing a request on their company letterhead are two planetary milling catalogs issued by the Plan-O-Mill Corp., 1511 E. 8-Mile Rd., Hazel Park, Mich. One catalog includes 14 pages of information on the No. 3 Plan-O-Mill for cylindrical parts up to 8 inches in diameter while the other catalog comprises 18 pages of data on the No. 5 Plan-O-Mill for larger parts.

Each catalog, which is printed in two colors and is 8½ x 11 inches in size, includes a large double-spread machine illustration together with tabulated features and specifications. The revolutionary principle of planetary milling is fully explained and graphically illustrated, and actual case histories of Plan-O-Mill form and thread milling in war

production are presented.

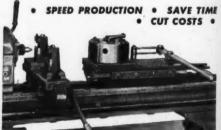
Acme Air-Cooled Transformers for power distribution are featured in a six-page bulletin released by Acme Electric & Mfg. Co., Cuba, N. Y. In addition to specifying applications for air-cooled transformers in war production industries, the bulletin describes in detail the various types of air-cooled transformers produced by the company and lists the complete range of 55-deg. ratings in auto type, two winding type, three winding type, and four winding type transformers up to 50 kvs. Copy free upon request.

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HEAVY DUTY Self-Indexing BED TURRETS

Complete unit with cutoff cross slide and tool posts designed for Logan, South Bend, Atlas and similar types of bench lathes.

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- Does not distort
- Will not rust
- Non-magnetic
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Made in all sizes with surface tolerance of .001" or .0003".

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Established 1901

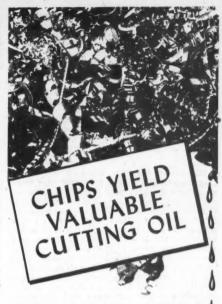


Type "CA" SPUR GEAR Speed Reducer

increase efficiency of Conveyors, Elevators, Hoists, Crushers, Mixers, Agitators, all kinds of slow movers. Maximum power transmission insured by posi-tive drive, constant reduction ratios, concentric power and motor shafts. Especially desirable where protection must be had from dust, dirt and grit. Vertical type also furnished. Send for Abart Speed Reducer Catalog showing over 75 types and sizes spur and worm reducers.

ABART GEARS: Precision cut to specifications. No Send B/P for estimate. Wire or write.





Reclaims up to 98.6%

Hidden in these chips are large amounts of valuable cutting oil. Tolhurst "Chip Wringers" recover as much as 98.6% of this oil through application of centrifugal force. Not only do you save money, but the plentiful supply reclaimed results in a more generous and conscientious use of your cutting oil.

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reduce tool wear . . operated efficiently by unskilled help. Write for new, free bulletin.

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OTHURST WRINGERS "21 Electric Gages to Aid Production" is the title of an eight-page leaflet designated as the GEA-3991 which is announced by the General Electric Co., Schenectady, N. Y. Among the 21 gages described and illustrated in the leaflet are thickness, magnetic, electrolimit, pressure, strain, and eccentricity gages. A chart featuring schematic representations of electric gage circuit applications is included in the leaflet, copy of which 4s available free upon request.

Handbook for the Welding and Cutting Operator. To aid users of the oxyacetylene welding and cutting process in prolonging the life of their equipment, the International Acetylene Association, 30 E. 42nd St., New York, N. Y., has prepared a 20-page pocket-size booklet entitled "Handbook for the Welding and Cutting Operator." Written in an easyto-understand manner, the booklet contains a list of concise do's and don't's for the man who wields the blowpipe and a wealth of other helpful information and suggestions on the care and maintenance of blowpipes, regulators, and weld-

ing and cutting accessories. Copy free upon request.

"Broaching Do's and Don't's." To assist broach users in increasing the efficiency of broaching setups and in conserving vital tools, the Colonial Broach Co., P. O. Box 37, Harper Station, Detroit, Mich., has prepared a bulletin suitable for wall mounting in broaching departments of war plants. The bulletin is printed in two colors and, when mounted, measures 17 x 11 inches.

Entitled "Broaching Do's and Don't's," the bulletin answers questions frequently asked regarding broach use. It also summarizes recommendations concerning broach alignment, correct mounting of broaching fixtures, and so on, and includes precautions relative to broaching operations to prevent broach breakage and reduce scrap.

In addition, the bulletin contains a series of precise recommendations for removing stuck pieces caused by failure of power supply, incorrect seating of the piece before broaching, and so on, both in hole and surface broaching. Copy of Bulletin 290 free to broach users.

BUY

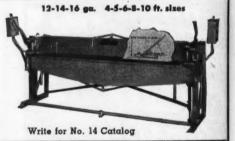
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ROLLER BEARING. Improved design is 40% faster and 20% easier on the operator. Heat Treated Jaws for stainless steel. Combination type for plain or box and pan bending.

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We have a size and style to fit your lathe and work requirements.

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Progressive tool and die shops are finding that no other method equals the speed and economy of electric welding for the fast, inexpensive fabrication of all sorts of tools, dies, jigs and fixtures.

And instantaneous heat selection is a typical example of how MARQUETTE'S tast, simple operation takes full advantage of the inherent speed of welding.

No questionable manual adjustment of confusing dials or gadgets is needed to secure perfect welding current. With a tap for every heat, a heat for every job operators of even limited experience can quickly make strong, uniform, flawless welds.

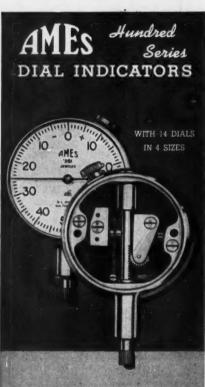
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These Dial Indicators have all the desirable features for measuring and checking accuracy. Four sizes to American Gage Design Committee specifications. Fourteen different dial numberings. One-piece, drop-lorged cases and stems. Wire attached bezels. Cup-shaped dials that need no springs beneath. Pinions and staffs of hardened steel, ground for accurate fitting and long wear. Various styles of backs and contact points. The best and most effective shock-absorbing wheel assembly, optional.

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Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive — Lost for years. Write for Circular.

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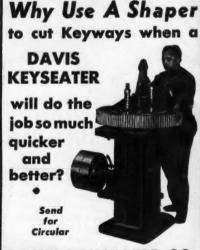
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NIELSEN TOOL & DIE COMPANY 1960 W. Eleven Mile Rd. Berkley, Mich.





DAVIS KEYSEATER CO.

Exchange and Glasgow Sts. ROCHESTER, N. Y.

Federal Testmaster Dial Indicator. A four-page folder illustrating and describing a universal type dial indicator—Testmaster—which can be readily adapted to a multitude of testing operations performed in machine shops and toolrooms is now available from Federal Products Corp., 1144 Eddy St., Providence, R. I., free upon request.

"Blueprint for Industry" is the title of an 18-page booklet issued by the Industrial Oven Engineering Co., 11621 De-

troit Ave., Cleve-land, Ohio, featuring engineering information on high production convection heated ovens for batch and continuous heating processes used in armament production. Handsomely printed on heavy stock, the booklet is illustrated entirely by reproduc-tions of blueprints showing typical installations of oven and materials handling equipment.

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Descriptions cover convection-heated box type or single compartment ovens, multiple compartment ovens, continuous ovens and furnaces. multi-pass conveyor ovens for preheating, double-dipping, baking and cooling, and a number of complete oven-materials-handling systems. The last two pages of the booklet contain engineering data, in-cluding the density, weight, and volume of gases, the specific heat and density of various materials, volume and weight of air, and various fan law problems. Copy of booklet free upon request.

"Spring Design and Engineering." Designed to provide executives, engineers, production men, and purchasing officials with practical, up-to-the-minute information regarding springs for mechanical and industrial uses; a 4 x 9-inch booklet entitled "Spring Design and Engineering" has been prepared by the Mid-West Spring Mfg. Co., 4262 S. Western Ave., Chicago, Ill. The booklet includes illustrated, descriptive, and tabular data on compression, extension, torsion, flat spiral, flat, and special springs, also wire forms. Copy free to the executives listed above upon request.

2 Small Parts Clamped in Exact Positions with DE-STA-Co Toggle Clamps

A difficult arc butt weld job is performed swiftly and accurately through use of two De-Sta-Co Toggle Clamps—the smaller one bolted to the work bar of the larger clamp. Note that because

of this unique set-up, there can be no variation in the point of welding. Also that parts can be inserted and withdrawn in minimum time. . . . A simple, inexpensive, time-saving fixture.

For clamping parts in production, use De-Sta-Co Toggle Clamps. . . . Available in all types and sizes. . . Bulletin No. 43, illustrating many practical uses, sent free on request.



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they're better!

Simplex Machinists' Jacks speed leveling of work on planers, milling machines and other machine tools. Notched base for fastening to bed. Self-leveling ball and socket cap. Side lock nut holds screw at desired height. 4 sizes: 2 34", 3 34", 51/4" and 71/2" closed heights,



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Made with I to 10 wheels. Stamp in perfect alignment.
Shank for Hand or Press
Stamping Plotform for stamping Name
No. 45
Plates and
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Plates and Platform other small

NEW Quick Set Ma-chine. One wheel can be turned quickly by knurled knob for consecutive numbering.

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SAVE SKILLED LABOR AND PRECIOUS TIME WITH THIS HIGHLY EFFICIENT DRILL GRINDER

FOR SMALL GAUGE AND FRACTIONAL DRILLS

Hundreds of War Production plants are saving valuable time and skilled labor costs by using Black Diamond Grinders for sharpening small gauge and fractional drills.

A few minutes instruction makes the most unskilled operator an expert on producing quantities of perfectly sharpened drills with lips of uniform length, correct angle and clearance. To speed war production and save expensive drill stock—to reduce drill breakage and release skilled labor for more important work, install a Bench or Pedestal type Black Diamond Drill Grinder at once. Such an investment literally pays for itself in sav-

ings in very short time.
The Diamond Dresser keeps the grinding wheel sharp cutting and the Web Thinning Attachment efficiently cares for the grinding of Notched, Colton or Crank shaft points.

Write at once for complete details.

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July, 19.

Mahr Forging Furnaces. Mahr Mfg. Co., Division of Diamond Iron Works, Inc., Minneapolis, Minn., has issued a 16-page two-color bulletin on a complete line of forging furnaces. The bulletin includes illustrations of the different types of forging furnaces together with full specification data. Copy of Equipment Bulletin No. 210 free upon request.

Examples of Centerless Grinding; Chapter IX, Tables for Estimating Production of Thrufeed Work. Copy of booklet free upon request.

spoked and plate center wheels, pulleys, and gears, also for pushing, spreading, bending, and clamping, is illustrated and described in a four-page bulletin prepared by Templeton, Kenly & Co., 1020 S. Central Ave., Chicago, Ill. Copy free.

Util-A-Tool, a unique tool for pulling

"Principles of Centerless Grinding" is the title of a 48-page booklet, designated

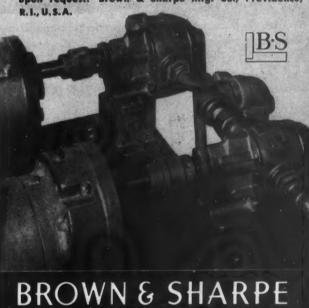
as the No. G-503-1, which has been published by Cincinnati Grinders Incorporated, Cincinnati, Ohio. This booklet is not only intended to explain the principles of centerless grinding but to supply a basic working knowledge of the centerless method of grinding to those interested in the subject. Well illustrated throughout, the booklet includes up-to-theminute information on centerless grinding as can be noted by a table of grinding wheel recommendations on Page 22 which contains the new symbols adopted by The Grinding Wheel Manufacturers Association.

Contents of the booklet range as follows: Chapter I, Basic Principles; Chapter II, Methods and Advantages of Centerless Grinding; Chapter III, Work Blades; Chapter V, Truing the Wheels; Chapter VI, Corrective Adjustments; Chapter VII, How to Economically Grind Small Lots on a Centerless; Chapter VIII, Typical

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For Transfer — Lubrication — Coolant Supply

Pump Sets with motors, pumps and bed plates, direct or gear reduction drives, are advantageous for many industrial applications. Here two Sets are transferring oil from hardening room to cooling tank. Catalog listing Rotary Geared, Vane and Centrifugal Pumps forwarded upon request. Brown & Sharpe Mfg. Co., Providence,



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A strong lacing for all types of belts. Put on with a hammer in a few minutes. Clinches smoothly into belt, compresses ends, prevents fraying. 2 - piece hinged rocker pins pro-vided. 8 sizes. In boxes, handy packages, cartons and long lengths.

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Wherever extremely accurate control of intermittent machine operation is essential the Hilliard Single Revolution Clutch is unequalled. Its accuracy has won for it the acceptence of Industry for cutting, punching and packaging operations.

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Atlantic Metal Cutting Band Saw Blades have been developed through twenty years of research and specialization.

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Convenient to use. MODERN MACHINE SHOP

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Special Containers

for narrow width coils, 100' length.

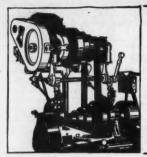
Magnus Metal Cleaning Handbook. The Magnus Chemical Co., 208 South Ave., Garwood, N. J., is now issuing a 72-page illustrated manual entitled "The Metal Cleaning Handbook." The first half of the manual is devoted to cleaning materials and the factors governing the selection of such compounds. The four main classes of cleaning materials—solvent cleaners, petroleum spirits, alkaline cleaners, and emulsifiable cleaners—are discussed separately. Under each are indicated the kinds of metals and articles for which each cleaning

material is best suited, as well as its major uses and disadvantages. In the section on alkaline cleaners, the following operations are discussed: Cleaning After Drawing and Stamping; Cleaning Die Cast Parts: Cleaning After Salt Bath Annealing; Cleaning After Slushing Oils and Rust Preventives; Cleaning After Buffing and Polishing, and Cleaning for a Chemically Clean Surface.

The second half of the manual includes complete information on modern metal washing machines. It discusses all types, from simple dip tanks to fully automatic, continuous conveyor machines for washing, rinsing, drying, cooling, and pickling operations. These besides machines. being described in the text, are also pictured in blueprint form. Several tables, charts, and illustrations complete the section. The balance of the manual discusses related metal processing operations such as drawing, lubricating, burnishing, and anti-rusting. Copy of Magnus Metal Cleaning Handbook free.

Racine Metal Sawing Machines for Armament Work. A four-page catalog now being issued by the Racine Tool & Machine Co., Racine, Wis., illustrates and describes the adaption of standard Racine Metal Sawing Machines to the cutting of shells, rifles, torpedo flasks, bomb ends, cannon and gun barrel forgings. Copy of Catalog No. 11-S free.



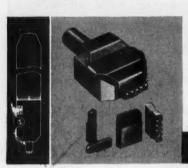


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In Remco Motor Drives strength is as carefully engineered as in a modern steel bridge. Rigid three point suspension, instead of the customary one or two points. Vibrationless! No overhang. No strain on tool. Simple installation! Low price! Write—Remco Products Corp., State and Hay Sts., York, Pa.

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For stamping any untempered metal or material with either numbers, letters or symbols. The diagram shows how the type is topered to the face to facilitate accurate positioning. Also exra body and shoulder, which gives added strength to the character. One piece solid bar steel stock assures long service.

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THE ACROMARK COMPANY

MANDOETH STORES FIRMARETH NEW HRIEF

IMMEDIATE SHIPMENT!

STEEL BOXES



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STACKING BOXES

An ideal all-purpose shop box. Sturdy all-welded construction; drop handles each end. Skids act as a positive stacking lock and re-inforce box at point of maximum wear.

Prices F. O. B. Factory, Philadelphia

AMERICAN METAL WORKS, INC.

1501 GERMANTOWN AVENUE

PHILADELPHIA 22, PA.

July, 1943

"The Cincinnati Hypre Line" is the title of a 28-page bulletin released by The Cincinnati Planer Co., Cincinnati, Ohio, presenting by means of large size illustrations and brief descriptions the line of machine tools marketed by this firm. Treated are double housing planers, open side planers, planer type millers, and vertical boring mills. Copy of Bulletin No. 153 free upon request.

"Aircraft Alloy Steels" is the title of a combined special 32-page stock list and

data book published by Joseph T. Ryerson & Son, Inc., 16th and Rockwell Sts., Chicago, Ill. Designed as a practical guide to aircraft steel stocks, prices, sales limitations, and specifications, the book is available to all buyers and technical men in aircraft and aircraft parts manufacturing industries.

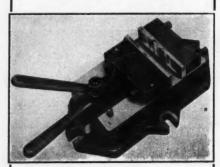
In addition containing listings of available steels. the book provides a condensed version of all the Aeronautical Material Specifications (AMS) which pertain to These AMS steel. specifications, originally developed by the Society of Automotive Engineers, are presented in brief tabular form to serve as a quick guide for the identification of the essential requirements of each specification. The Army-Navy Aeronautical Specifications (AN-S and AN-T), which cover the new NE National Emergency Steels acceptable to the aircraft industry, are also presented in condensed tabular form.

"Pneumatic Loading of Industrial Machinery." An improved method whereby air is used to establish the nip or pressure of roll-type machines is described in Bulletin B-306, "Pneumatic Loading of Industrial Machinery," now being issued by The Foxboro Co., Foxboro, Mass. The bulletin presents a simple explanation of the pneumatic loading principle, together with a schematic diagram of a typical installation. In addition, the bulletin includes several photographs showing Foxboro Pneumatic Loading Systems installed in plants in various industrial fields. Copy of Bulletin B-306 free upon request.



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Operator easily applies tremendous POWER with one hand manipulation of both binding and cam-faced handles. Dual-operation principle of handles SPEEDS UP gripping and releasing and therefore reduces operating costs. Maximum STRENGTH comes from semi-steel base and movable jaw of single heat-treated steel drop-forging. Movable jaw, with its ground fitting surfaces, can ACCU-RATELY hold single piece at either end of jaw.

Write for details.

The Hartford Special Machinery Co.

"Zinc Alloy Die Casting" is the title of a 28-page illustrated booklet now being distributed by The New Jersey Zinc Co., 160 Front St., New York, N. Y. The purpose of this booklet is to answer those questions most often asked about zinc alloy die castings. The information presented is designed (1) to help prospective users to properly evaluate die castings for war production and (2) to aid in postwar product planning. Copy of booklet free upon request.

"Maintenance of Farm Implements by Arc Welding" is the title of a 10-page bulletin released by The Lincoln Electric Co., Cleveland, Ohio. The contents of the bulletin represent a digest of arc welding techniques and procedures to be followed for obtaining best results in keeping farm equipment in good repair. A total of 47 illustrations are included in the bulletin to supplement the text which covers such subjects as "Arc Weld Surfacing," "Hard Facing Worn Parts," "Building Up Worn Parts," "Repair of Broken Machinery," and "Building and Altering Equipment." Copy of Bulletin 433 free upon request.



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Vascoloy-Ramet Carbide Tool Poster. Vascoloy-Ramet Corp., North Chicago, Ill., is now issuing a 48 x 27-inch wall poster which shows graphically four simple ways for obtaining longer life from cemented carbide tools. The poster is printed in red, white, and blue and contains no advertising other than the company's logotype. Copy free upon request.

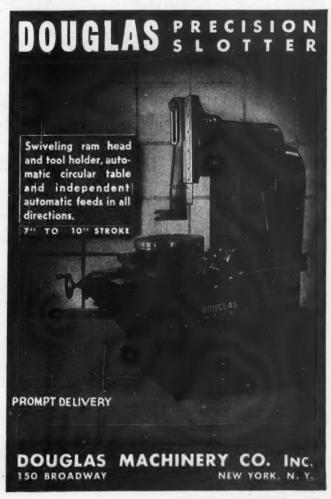
"Shaw-Box" Standard Cranes. Man-

ning, Maxwell & Moore, Inc., Shaw-Box Standard Crane Division, Muskegon, Mich., is now issuing a 20page catalog containing illustrations, descriptions. and outline dimen-sions of "Shaw-Box" standardized production built cranes, ranging from small pushtype crane bridges to large capacity hand - operated cranes. The catalog also includes information on cranes with electrically operated hoists for "standby" service. Copy of Catalog No. 213 free upon request.

"A Report to the Nation" Lombard Governor Corp., manufacturer of milling machines, inspection and general Navy equipment, announces the completion of a 68-page three-color catalog showing its plant, many prod-ucts and versatile methods of machining. Entitled "A Report to the Nation," the catalog, which is attractively bound in colored plastic and provided with an

unusual cover treatment, includes both antique and coated paper, the antique paper section being devoted to the his-tory of the plant, background of the business and future prospects. The entire middle section of the catalog is devoted to pictures of the plant, methods of manufacturing, personnel, and some of the products of the company.

Copy of the catalog may be obtained by persons addressing a request on their company letterhead to Lombard Governor Corp., Dept. 29, Main St., Ashland, Massachusetts.



ELIMINATE EXCESSIVE FRICTION
in Your Cutting Off Operations
at these VITAL SPOTS

HERE

And You Immediately
Correct Most of Your Breakdown

STEP UP PRODUCTION

THESE

Patented Cutting-off Blades causes chip to collapse. This reduces the width of the chip and permits it to pass between the sidewalls of the cut with greatly reduced friction.

2 Because they are tapered* their full length, Luers Blades

troubles and

2 Because they are tapered* their full length, Luers Blades
T Series prove exceptionally efficient for cut-off operations.
They maintain a constant back clearance through repeated
resharpenings. Only front face ever requires resharpening.

1 The hollow-ground top of Empire Tool Company's Luers

3 Side clearance is provided on both sides of blade by virtue of its "T" shape.

All these features, found only in Empire Tool Company's Luers Patented Cutting-off Blades, contribute to the elimination of excessive friction. They make for greater production, with less effort and with less waste of time—and incidentally, with the greatly desired advantage of conserving critical materials.

* Parallel Blades on longitudinal cutting width available for shallow cut-offs and growing operations.

Empire Tool Company manufactures Lucra Patented Cutting-Off Blades and Holders under license issued by John Milton Lucra Patents, Inc.

BUY WAR BONDS

The Blades That Reduce Friction

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immediately

from Stock.
Send for Catalog



B774 Grinnell Ave. Detroit 13, Mich. JOB TIME REDUCED FROM TEN MINUTES
TO THIRTY SECONDS WITH...

Walker-Turner Drill Heads.

THE compactness and flexibility of Walker-Turner Drill Heads makes it easy to design special tooling set-ups. An interesting application is shown here in the plant of William Mogey & Sons, manufacturers of precision optics. The customary method of rough grinding is shown in the lower illustration, this operation requiring ten minutes.

Two Walker-Turner Drill Heads assembled into an automatic machine completes the same operation in ten seconds. This is an indication of how Walker-Turner Drill Heads can be used in special tooling arrangements for intricate drilling, tapping, reaming and grinding opera-

tions. Such set-ups can be made quicker and at lower cost than by processes and methods formerly used. Prompt delivery of Walker-Turner Machine Tools is assured to war industries.

WALKER-TURNER COMPANY, Inc. 773 Berckman Street, Plainfield, N. J.



CONSTRUCTION FEATURES

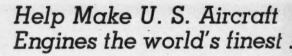
- ★ One Piece Head Casting, Precision bored to assure correct bearing alignment.
- ★ Six spline spindle runs on four precision ball bearings.
- ★ Pulley straddle mounted between bearings to eliminate spindle "whip".





MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED . RADIAL DRILLS METAL-CUTTING BAND SAWS . POLISHING LATHES . FLEXIBLE SHAFT MACHINES RADIAL CUT-OFF MACHINES FOR METAL . MOTORS . BELT & DISC SURFACERS



STURTEVANT TORQUE WRENCHES protect the performance and life of most U. S. Aircraft engines — not only travel with them in the tool box but are used to control the torques applied in their manufacture.

They are used to assure the uniform "set" of vital screws, to prevent uneven strains and warping, to gauge the set of

spark plugs, to measure frictional drag, etc. Sizes to accurately measure torque from 0 to 7200 in. lbs., they eliminate work and haphazard tightening. They are introducing new accuracy in the manufacture of even the most delicate instruments . . . also come in sizes for the heaviest work.

Products of STURTEVANT, the pioneer manufacturer of accurate torque wrenches, they have the flat beam which eliminates all springs, adjustments and fragile mechanisms or moving parts. They are permanently accurate!

Write for

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FRICTION
ADJUSTMENTS
MOVING PARTS
FRAGILE

MECHANISMS

STURTEVANT

Only a STURTEVANT TORQUE WRENCH can give you these most important features.

PA STURTEVANT CO.

CAPACITIES from 0 to 7200

inch pounds

New Delta Chip-Breaker Grinder is simple, fast, dependable, accurate — and much lower in cost . . .

Gives all-around, long-time satisfaction in grinding the chip-breaker groove on carbide-tipped tools used also for other production grinding.

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In grinders costing many times as much, you do not find many of the new, exclusive features you get in this latest Delta machine. It's husky, solid (weight 700 pounds), over 6 feet high, an accurate machine designed to turn out a big volume of work. Yet its cost is amazingly low.

Spindle shaft specially designed. Bearings widely spaced to provide permanently true alignment. Wheel mounting system permits removing either wheel alone, or wheel and adapter. Table is smooth operating with convenient control wheels — rides solidly on long ways.

Equipped with the new "UNIVISE"

...holds the tool at any conceivable angle Four distinct planes of adjustment. Can be accurately reset at a moment's notice so that the tool may be reground at precisely the same angles as originally set.

The features and performance of this Delta machine are amazing to those accustomed to paying far more than its cost. Investigate—be first in your plant to discover the convenience and economy of this new Delta grinder. See it at your Delta industrial distributor's — check priorities and deliveries.



TEAR OUT AND MAIL THIS COUPON FOR FULL DETAILS



THE ARMY-NAVY "E"
—awarded for excellence
in the production of machine tools vitally needed
in the war effort.

THE	DELTA	MANU	FACTURIN	IG	COMPA	INY
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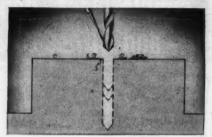
Please send me your new catalog giving full details on the Delta Chip-Breaker Grinder and your full line of low-cost machine tools.

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Helpful Hints for Drilling Tough Steels



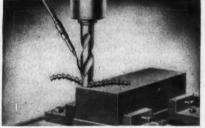
1. Use steady pressure and do not let drill ride without cutting. Back out the drill frequently to relieve chip congestion.



2. Back out when drill has reached a depth of three to four times the diameter of the drill for first insertion—one to two for second insertion three to four for third.



To avoid drill breakage, always run at proper speed. A \(\frac{1}{6}'' \) center drill should run about 1800 r.p.m. (30 s.f.m.). A 1'' drill at 115 r.p.m. for same surface speed.



4. For deep drilling use a short spiral drill and Chillo No. 140 or 143, cut back with Amplex No. 00, to further reduce high temperatures. For shallow drilling use Chillo No. 90 or 93.

5. If you are faced with an unusual machining operation or if you are not satisfied with present results, call in a Cities Service lubrication engineer for consultation. His experience with Cities Service precision-made cutting oils on all kinds of machining operations is certain to help you as it has others. There is no obligation.

OIL IS AMMUNITION - USE IT WISELY !



For a copy of an informative booklet "Metal Cutting Lubrication," write to Cities Service Oil Company, Room 1661, Sixty Wall Tower, New York, Dist. 5. Free to users of cutting oils.



KENNAMILLING, sometimes referred to as "Hyper-milling" or "Su-per-milling", was in three-shift oper-ation in the McKenna Metals Company plant as early as April, 1940.

Devised by McKenna engineers, KENNAMILLING has been used for three years by KENNAMETAL customers also, to obtain greatest steelcutting production on their face milling operations.

Because of the inherent hardness and strength of KENNAMETAL steelcutting carbide, KENNAMILLING has maintained its leading position despite the entrance of similar processes into the field of face milling with cemented carbides.

The characteristic strength and hardness of KENNAMETAL have been combined with the shock resistant well designed Mechanite bodies of GRAYSON milling cutters to form the most efficient milling cutter available, the GRAYSON - KENNA-METAL milling cutter. Through use of these cutters production is being tripled on operations which demand milling of steel, cast iron, aluminum. aluminum-silicon alloys, magnesium -aluminum alloys, brass, bronze, and non-ferrous materials.

KENNAMILLING With GRAYSON-KENNAMETAL MILLING CUTTERS, HAS THESE ADVANTAGES:

- GRAYSON-KENNAMETAL milling cutters cut steel at amazingly high speeds.
- 2 KENNAMILLING is distinguished by greater table feeds and greater load per tooth. (Instead of the customary 001 to .003 the load per tooth during KENNAMILLING is .003 to .016)
- 3.KENNAMILLING employs negative rake and negative helix angles for maximum cutting efficiency.
- 4 These double negative rake angles-added to KENNAMETAL'S non-galling properties, hard-
- ness, and rupture strength—permit the milling of high Brinell steels.
- 5. These double negative rake angles also produce a very rugged tool—milling machines have been stopped in the cut without chipping the edges of end mills.
- 6 KENNAMILLING produces a precision finish. 7 KENNAMILLING is not limited to light cuts.
- Write for complete information about KENNA-MILLING . . . McKenna Metals Company can give you assistance based on years of face milling production with cemented carbides.





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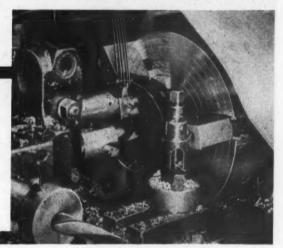
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needs all-out support at home. For increased output in all types of *MACHINING* operations use . . .

... SINCLAIR CUT-

COOLANTS. These oils are designed for high precision, bright finish cutting. They increase tool life and reduce power loss.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE
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July, 1943

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Billings always will be good! MEN of BILLINGS

47 YEARS





will make it so.

The world wide reputation for producing honest forgings rests firmly on the shoulders of the "Men of Billings." From father-to-son, the intricate steps in the art of forging are carefully repeated. Each generation contributing the benefits of its research and ingenuity

Todays' "Men of Billings" are hard hitting men - earnestly doing their bit in the production of essential armament forgings and industry's building tool - the wrench.

The building of tomorrow's world will be aided by the production of tomorrow's Wrenches and Shop Tools by Billings
Yes, Billings always will be good!



Billings Workers War Production Drive Slogan "LET'S PUT IT OVER"

FORGED Billings TOOLS



PUTNAM END MILLS FOR FINISH MILLING

END MILLS AVAILABLE FROM STOCK

Some sizes and types of Putnam End Mills can be supplied immediately from stock. Your Putnam sales representative can tell you what are new available. Exceptional finish from the milling operation alone can be obtained by using Putnam Hi-Speed End Mills. These tools are of a design and quality that make them especially adaptable to operations involving high spindle speeds, precision movements, rotary head motion, or other difficult conditions. No matter what kind of a milling job you have, a Putnam Hi-Speed End Mill is always "the tool for the job."



PUTNAM TOOL COMPANY

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SEMI-STEEL and ALL-STEEL STANDARD DIE SETS

SPECIAL DIE SETS

PRECISION DIE SETS

DOWEL PINS

SPRINGS

ACCESSORIES

Scores of new customers have come to us because we give prompt service on standard die sets and accessories, and also as a result of our sincere efforts to be helpful in today's shortages and production problems. We invite your inquiries.

STEEL PLATE — fabricated or torch cut to size or to your template

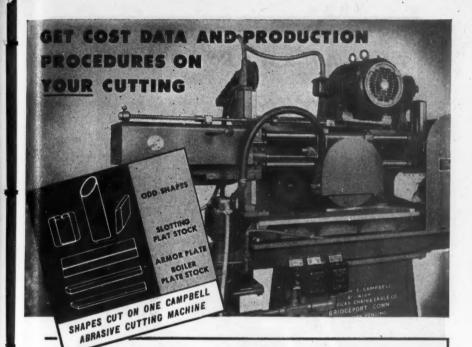
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DETROIT DIE SET CORP.

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Sales and Service Offices in — NEW YORK • BUFFALO INDIANAPOLIS • DAYTON • MINNEAPOLIS • TOLEDO



• Campbell engineers have provided many manufacturers of note with cutting programs that have opened the way to new highs in production and lows in the cost of cutting. These programs have proved sound—based on the practical experience of the Campbell complete line of Abrasive Cutting Machines—the only complete range of cutting machines.

Currently, CAMPBELL ABRASIVE CUTTING MACHINES are being used on all grades of steel, annealed and unannealed; non-ferrous alloys; plastics; glass and ceramics. They are cutting solid bar, tubular and flat stock.

To get the cost data for your company, write the Campbell Engineering Department. State what materials you cut, shapes, sizes, length before cutting, lengths of cut-off pieces and production required per hour. No obligation.



ABRASIVE CUTTING MACHINES

ANDREW C. CAMPBELL DIVISION . Bridgeport, Connecticut

ALSO MAKERS OF A COMPLETE LINE OF NIBBLING MACHINES

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12 Reasons Why!

WELLS METAL
CUTTING BAND SAWS
DO THE JOB ...
BETTER
FASTER
ECONOMICALLY

No. 8

- Heavy, rugged construction throughout insures precision work, long life.
- (2) Vibrationless operation means truer cutting, faster cutting.
- (3) Guides, mounted on heavy, precision machined I beam can be moved nearly flush against work. Accuracy meets standard requirements.
- (4) Will cut various metals, of many shapes, including tool steels, stainless steels, etc.
- (5) Continuous cutting method assures maximum cutting speed.
 (6) Because the saw blade runs cool, it can be operated at the highest speed suitable to the type of metal being cut.
- (7) Speed can be regulated 30, 90, or 130 feet per minute.
- (8) Low initial cost for a metal cutting band saw having capacity and quality.
- (9) A minimum of moving parts means long service at low maintenance cost.
 (10) Low power consumption – 1/2, 1/3 and 3/4 h.p. motor
- depending on size of saw.

 (11) Small floor space only 24" x 60" for Model 8 and 30"
- x 73" for Model V-12.
 (12) Faster cutting of Wells Metal Cutting Band Saws means fewer man-hours per job.

Ask your Mill Supply dealer to give you a Wells demonstration. No obligation, of course.

Write for your copy of the new Wells Catalog





METAL CUTTING
BANDSAWS

BOS TYLER ST. THREE RIVERS, MICHIGAN

No. V-12



Syncro tools and Syncro craftsmen dedicate themselves to production for Victory . . . in order that freedom of the people, by the people and for the people shall not perish from this earth.

Manufacturing facilities available for development of precision machine tool parts — special tools — fixtures — production parts . . . now and after Victory.

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Ammond

SELF-CONTAINED GRINDER AND DUST COLLECTOR

ATISFY ALL

SHOP SUPERINTENDENT

"We needed more production!"



"Hammond No-Dust Grinders gave it to us . . . and saved installation time we just plug them into electrical outlets . . . no need to fuss with extra piping to dust collecting systems."

FOREMAN

"We needed more space and heavier grinders!"



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"Hammond No-Dust Grinders helped us conserve 50% floor space . . we've saved man-hours, toe, because these grinders are faster producers than our lighter machines. The men do better work now!"

THE MAN WHO USES IT



"This heavier Hammond grinder saves time for me . . I get more work done . . have extra energy left at the end of the day and I sure appreciate that!"

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- General Purpose Grinder Ahrasive Belt Grinders

- ☐ Carbide Tool Grinders ☐ Rotary Automatics ☐ Chip Breaker Grinders ☐ Cylindrical Polishers
- Heavy Duty Grinders Polishing Lathes

Rear View Dust Collector In Base

> 3 POPULAR SIZES For 10", 12" and 14" Wheels



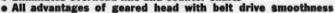
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These Features are Responsible:

 No belts to shift—Drives to large step of cone at all speeds Eliminates overhead line and counter shafts





The high-speed, volume-production methods of wartime call for modern machines, modern methods. More speed...greater production...you must have them to keep apace! Enlist the aid of TURNER UNI-DRIVES. They'll increase production like an extra shift ... save time ... speed up work ... keep down power costs. They're doing it in scores of shops and plants. They'll do it in yours. TURNER UNI-DRIVE is the successful one motor drive. Easily and quickly installed. Increase the efficiency of machine and operator. One trial will

Right now...today...investigate TURNER UNI-DRIVE. See your dealer, or write or wire us for full information.

IT DOES THE JOB on Lathes, Shapers, Milling Machines, Turret Lathes, Radial Drills, Boring Mills, Hobbing Machines and various machine tools. Also for Browne & Sharpe and Cleveland Automatic Screw Machines.

The TURNER UNI-DRIVE COMPANY

(Sales Div. Turner Machinery Co.) 3416 Terrace Street Kansas City, Missouri

TOOL DRIVES . ORDNANCE TOOLS . AIRCRAFT FITTINGS PRODUCING MACHINE

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A great deat has been written about absenteeism among workers. But cutting tools that go off the job too often, also

Reduce this "absentool-ism" by using slow down production. TECO Carbide Tools . . . the carbides that stay on the job longer. They hold cutting edges and maintain accurate tolerances for longer runs, producing more pieces between grinds. Less grinds mean less machine-down time - thus more product-

ive hours for your men and machines. The greater resistance to wear and breakage provided by TECO Carbide Tools, is

the result of rigidly controlled hardness, density and uniformity. TECO Carbide Tools and Blanks are avail-TECO Carbide able in grades, styles and sizes for practically every machining need. Have a representative discuss your requirements. Write for detailed catalog.

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with TOOLS

- cut at higher speeds
- . . . hold cutting edges longer
- ... produce more pieces between grinds
- reduce grinding and re-tooling time

Pioneers in Tungsten Carbides for over a Quarter Century



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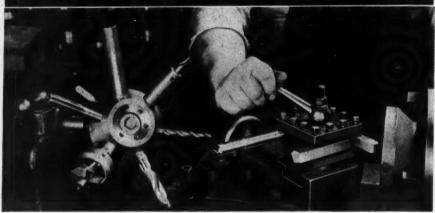
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On-the-job Accuracy is built into every **ENCO** Lathe Turret



Save time --- Increase production

The Model B ENCO Tailstock Turret shown above on the left cuts operation time in half by mounting center drill, %" and %" drills, counterbore and reamer. Its built-in accuracy assures positive centering of all tools. • The Model 4-S ENCO Turret Tool Post shown above on the right eliminates tool changing by holding to a constant setting facing, turning, and finishing tools together with boring bar.

"ENCO" Turret Tool Posts

ENCO Turret Tool Posts are easily operated and easily maintained. Mount rigidly in T-slot and easily maintained. Mount rigidly in 1-slot of compound. Indexing is easy and positive and turret keeps setting accurately. Numerous users of our turret tool posts are holding limits of .001 plus or minus, without the use of miccrometers. 12 position indexing enables the compound to be set at any angle. Carburized hardened steel construction. When ordering, precify make of lathe swing and maximum specify make of lathe, swing and maximum

"ENCO" Tailstock Turrets

The ENCO Tailstock Turret increases the normal tool capacity of your lathe six times. Its positive indexing mechanism — tapered and hardened — means accurate centering of all tools each time they are indexed for use. In the ENCO your tools are mounted in tool holes bored to close limits after assembly.

Model A-21/2" dia, with No. 1 or No. 2 Morse Taper Arbor and six bored 5/8"

Model B-1-5" dia. with 1" straight shank and 6 bored 1" tool holes for use on Turret Lathes

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KNURLED SOCKET HEAD CAP SCREWS

Their knurled socket heads just naturally help speed assembly work . . . providing a non-slip grip for greasy fingers . . . permitting the screw to be turned faster and farther before a wrench is needed. Yet you pay no more for this added time-saving feature when you buy the Knurled "Unbrako." Why not order some "saved time" today?

HOLLOW SET SCREWS

Another time-saver . . . heips prevent machine breakdowns caused by the ordinary set screw versing losse. When tightened as usual, hunted point digs in . . . holds tight against vibration, yet can be used over. Sizes: No. 4 to 1½" diam. . . . Write for 'Unbriat's "Screw Catalous".

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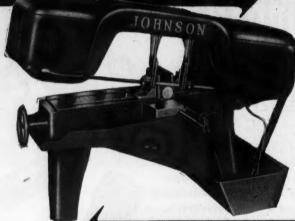
KNURLING OF SOCKET SCREWS ORIGI-NATED WITH "UNBRAKO" YEARS AGO

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NEW! WET-CUTTING MODEL FOR ULTRA HIGH SPEED METAL CUTTING JOHNSON METAL CUT-OFF BANDSAW



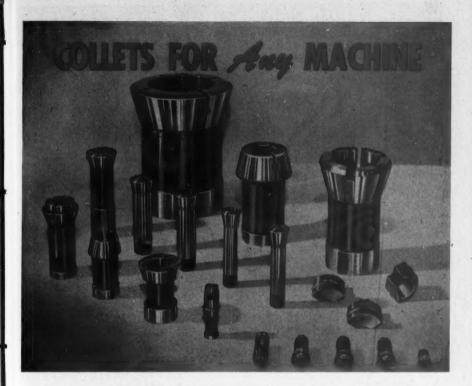
CAN ALSO BE ADAPTED TO EXISTING JOHNSON DRY - CUTTING BANDSAWS

The Johnson Coolant Model offers unusual advantages for production requiring exceptionally high-speed... on some jobs increases as high as 200% can be attained... Longer blade life assured!

- ★ NO SEPARATE MOTOR RE-QUIRED—one power source does cutting and operates coolant pump. No special wiring or switches necessary.
- ★ COOLANT FLOWS AUTOMAT-ICALLY—Machine speed controls flow of coolant in direct proportion to speed of blade.
- ★ BLADE WIPERS remove coolant after cutting; no danger of bearing lubricants.
- ★ PUMP SHAFT runs on bronze bearings, quietly, efficiently; handles any cutting fluid.
- ★ DRY CUTTING may be handled by simply disconnecting pump.

JOHNSON MFG. CORP. ALBION, MICH.

Write today for descriptive literature to Sales Office, 5003 Chrysler Bldg., New York



Any collets which you require for your screw machines, lathes or milling machines can be supplied by Modern Collet. Most are listed as standard catalog items. In cases where machines have been introduced since our current catalog was printed, collets are being produced and are supplied regularly for these latest models.

If you need a type not generally used, our complete information file covering approximately 7500 different collets will give us every specification we need ... and the exact collets required can be manufactured without delay or unnecessary correspondence.

Full information on all Modern Collets including the well-known Martin Master Collet will be sent you immediately upon request.

MODERN COLLET and MACHINE CO.

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Ecorse, Michigan



NOW! A NEW FURNACE FOR HEAT TREATING SMALL PARTS

HERE ARE 5 OF MANY USES FOR THIS ELECTRIC FURNACE

- HARDENING SMALL MACHINE PARTS Do your own heat treating—avoid delays of relying upon overcrowded commercial heat treaters.
- 2 DRAWING OR TEMPERING METAL PARTS Use it as auxiliary equipment—save expense of using large furnaces for small parts.
- 3 NORMALIZING OR ANNEALING SMALL PARTS— Handle this work easily and quickly—save time and money.
- PRE-HEATING FOR HIGH-SPEED HARDENING or for use on miscellaneous small parts.
- 5 EMERGENCY REPAIR ORDERS—Use it to handle them immediately and conveniently—prevent shut-downs.

This small compact electric furnace is ideal for small tool and die shops lacking heat-treating facilities. It prevents delays of heat treating due to over-crowded conditions in commercial heat-treating plants. It is compact, inexpensive, handy and easy to operate. Small parts can be handled without heat and power waste of a large furnace. Preheating of small high-speed tools can be handled quickly and easily. Repair parts on emergency orders can be rushed to completion in your own plant—no need to send them out for heat treating.

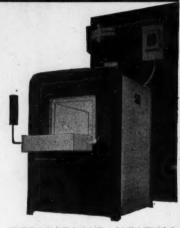
OFFERED IN TWO SIZES

Type	Chamber Capacity	Amps 115 V	Watts	Amps 230 V	Price
MH-3	8"W 6"H 14"L	29.6	3400	14.8	\$124.00*
MH-4	10"W 6"H 18"L		4800	20.9	\$191.00*

*Includes Cast Nickel Chromium Hearth Plate

MAX. SAFE TEMPERATURE—Continuous operation, 1750° F.; Intermittent operation, 1850° F.

AUTOMATIC CONTROL—Indicating Controlling Pyrometer—Thermo-couple and lead wire complete—\$152.40.



REPLACEABLE HEATING ELEMENTS Replaceable nickel chromium resistors embedded in rectangular refractory blocks. Elements form inner walls of furnace chamber, and may be replaced easily and quickly after removing rear panel—furnace structure remains undisturbed.

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Bullard Vertical Turret Lathes

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Slotters

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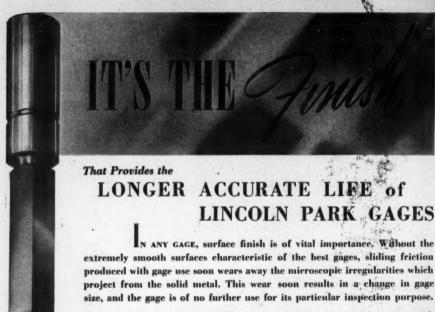
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Vertical Boring Mills

> For Motorizing Lathes, Milling Machines, Shapers, Turret Lathes, Radial Drills, Slotters, Bolt Cutters, Gear Cutters, Die Sinkers, Boring Mills, etc.

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At Lincoln Park, careful control in grinding and lapping produces gages with extremely high finish. A large department, operated under ideal working conditions and staffed with highly skilled men and women, is devoted to lapping operations alone. Here Lincoln Park Class XX and X gages are finished

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No smaller measurements can be made of surface roughness than those which are secured in the Lincoln Park plant. In constant use is a special Profilometer which incorporates an extra step in its range of sensitivity. It is adapted to the measurement of surfaces three times as smooth as those which can be measured by the standard instrument. Many of the finishes produced by Lincoln Park require this extremely accurate inspection.





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Today's rush orders emphasize the need to discard Today's rush orders emphasize unit is a self-con-old-style bar-feeding. The Lipe unit is a self-contained, automatic, power feeding device that handles any material in any shape bar or tube faster, easier, more safely. It eliminates feed fingers and related parts. In a nut shell, here's why the Lipe Way is the modern way-

1. 15 to 20 minutes saved per 12 ft. bar.

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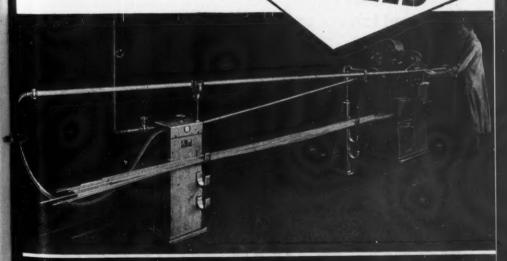
Lipe Pneumatic Bar Feeds are available for prompt delivery for any hand-screw machine of 2½" dia. capacity or less, and for single spindle automatics.

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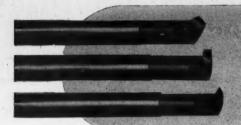
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STYLE A For general boring

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For facing and bottoming

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Accept More Feed—Increase Production

Since the greatest cutting force is always directed toward its largest cross section, the Bokum Tool can accept more feed than ordinary boring tools; therefore, it completes the job faster.

Original form of tool is never changed through resharpening.

For complete description of these tools send for the catalog that meets your particular needs.

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July, 1943

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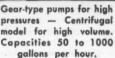
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IN 8 HOURS

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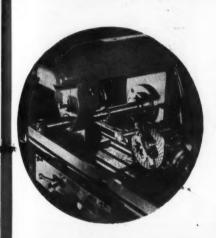
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for Toolroom
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Size 32" x 8"
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THE PRECISION BUILT INTO THE DOUGLAS MILLER



provides efficiency and speed to produce small parts requiring the extreme accuracy essential for war production.

Rigid well balanced design, combined with central control make for easy operation, permits the release of highly skilled labor for other tasks.

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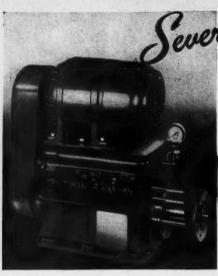
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SELF CONTAINED—available either right or left hand-so when several units are mounted on one base to be tied together, operation can be controlled from one location. The operator is not compelled to walk around the machine to make adjustments.

The TWIN RAM Hydraulic Unit has high salvage value, for it can be lifted from one base on which it has served its purpose, and be placed on another base to provide power for a different job. Spindle speeds can also be changed to meet desired requirements.

The distinctive electrical control makes possible rapid advance, feed, dwell, and rapid return.

The unit is made in two sizes: Model 2000, which drills up to % inch diameter in machine steel (for single drill or equivalent for multiple drilling) and Model 5000 for drilling up to 2-inch diameter (for single drill or equivalent for multiple drilling).

Send for literature giving complete information.

Installation can be provided to take care of any conditions such as:

- (1) Rapid approach, feed, rapid return.
- (2) Rapid approach, feed, second rapid approach, then second feed, and rapid return.
- (3) Rapid approach, feed, dwell, rapid return.

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AND BUILDERS OF PRODUCTION MACHINES

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STUBS can be held to a minimum by using longer and larger diameter electrodes. In that way you leave fewer stubs for a given length of weld, and also save time by reducing the number of electrode changes. In addition, you can increase welding speeds 25-50%, because larger diameter electrodes provide much faster metal deposition.

This is only one way to stretch your supply of welding electrodes. See that all your welders prevent waste by observing this precaution and those shown at right.

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- 1. Use electrodes down to a 2" stub.
- 2. Don't bend electrodes un-
- less absolutely necessary.

 3. Make sure that joints are fitted properly before welding.
- Make legs of fillet welds equal; face of fillet welds flat.
- 5. Be sure to save all your stubs.



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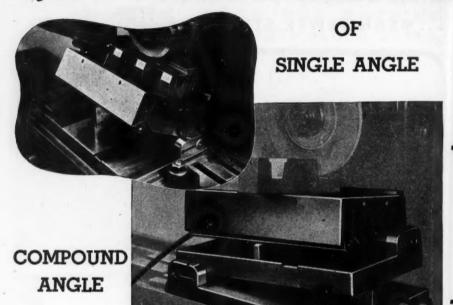
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With Magna-Sines in use for your angu-

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Two sizes are supplied in both compound and single angle models. Nonmagnetic models are also available for inspection purposes.

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Price \$1.00 Each In Any Size

New Low Prices—Increase Production—Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining castiron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left-100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size	
R-100	L-100	1/4 x 1/4 x 2	
R-101	L-102	18 x 18 x 21/4	
R-103	L-104	% x % x 21/2	
R-105	L-106	16 x 16 x 3	
R-107	L-108	$\frac{1}{2} \times \frac{1}{2} \times 3\frac{1}{2}$	

78 X 78 X 3

1/2 x 1/2 x 31/2

Below— 300 Series

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

SERIES 100

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.



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We Carry Silicon Carbide Emery Wheels for Grinding Tungston Carbide Tool Bits.

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Up-Grade Your Workers and Your Work with the taft-peirce NO. 1 Surface Grinder

Workers can do better work and more of it—with far less effort—on this differently designed precision machine. Without complicated and time-wasting tool setups, they can produce surfaces which are flat to extremely close tolerances. This machine is made readily adaptable, even to difficult angle and shoulder work, by its unique tilting wheelhead. And finally, it is built to re-

tain its precision through years of incessant operation, with hardened and ground ways, ball mountings, and rigid construction. If you need to produce ultra-accurate work on small tools and parts—the kind of work which is beyond the capabilities of conventional grinders—write for the newly published bulletin which gives complete information about the Taft-Peirce No.1.

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July,

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12" Long

Prompt Delivery

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9/32	12	9	3.50
19/64	12	9	3.50
5/16	12	9	3.75
21/64	12	9	3.75
11/32	12	9	3.75
23/64	12	9	3.75
3/8	12	9	4.00
25/64	12	9	4.00
13/32	12	9	4.25
27/64	12	9	4.25
7/16	12	9	4.50
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Weed and Metal — also Match Plates. For all kinds of castings—large or small. Estimates on Request.

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Excellent facilities for grinding gears, cams, threads and splines on a contract basis.

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Will buy patent outright or pay royalty. Can assist in engineering and research if necessary. Your replies will be kept confidential.

Reply to Box 73 c/o of

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and %-inch diameter machine bolts are up to 6 inches long; the %, 1/4 and %inch machine bolts up to 12 inches long, the %, % and 1-inch diameter machine bolts up to 20 inches long, and the 1-inch, 1½-inch and 1½-inch diameter up to 22 inches long. Address L. B. Dutton, General Superintendent, at the above address.

("The Last Word" continued from page 398)

may run into high figures due to the industry and ability of the worker, but in such cases the high wage is fair because of the high production that has been delivered by the worker. The Jack and Heintz organization in Cleveland is a notable example, as is also the organization of the Lincoln Electric Company. Both of these firms have recently received a great deal of publicity due to the very high.

wages paid to workers in their plants, but it has that these workers were paid only their just due, earned by them through ingenuity and diligence.

If the War Department can ever get around to allotting contracts on a basis, of costs as set up in plants operated by experienced production men and operating under a wage incentive system, armament costs will go down to the tune of billions of dollars, and production figures will delight even the most sanguine.

been brought out by Congressional investigation that these workers were

The Feminine Influence

by Norman S. Rogers

LOOKS LIKE THEY'LL HAVE TO PUT A BRASSIERE ON THIS FUSELAGE!

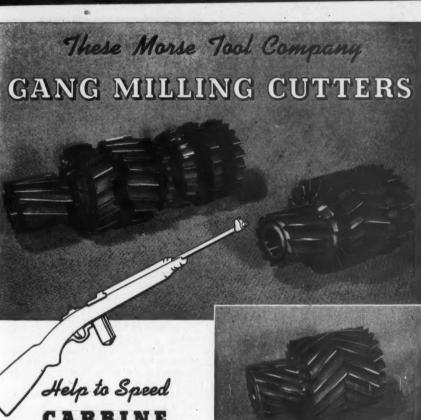


I DIDN'T NOTICE
ANY BULGE ON THE
BLUE PRINTS FOR
THAT PLANE!



and

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CARBINE PRODUCTION

Over apperiod of many years, innumerable types of gang mills and arbors have been manufactured by Morse Tool Company. Typical of these cutters now being used in many armament plants are those which mill the bottom slides of the powerful new carbines used by our armed forces.

Pictured above are the eight cutters which make up the assembly shown to the right and which are used for a finish milling

operation. The single illustration shows an assembly of five cutters used for roughing. A number of sets of each of these gang mills are now performing efficiently and accurately in plants where carbine production is at peak volume.

Morse Tool Company manufactures also many types of special milling and form relieved catters, as well as complete lines of standard high speed tools.

Morse Tool Company DETROIT . MICHIGAN

The Last Word . . .

AS we go to press we note that Representative Albert J. Engel of Michigan, reporting on a 44 day inspection tour of 47 war plants as an emissary of the House Appropriations Committee handling Army expenditures, asserts that war weapons are costing the American public too much because of excessively high wages paid to workers-most of whom are unskilled. Mr. Engel said he undertook the investigation with the determination to learn "Just why a 105 mm gun on two wheels costs \$21,000 and on a self-propelled mount costs \$83,000, and why Springfield rifles cost \$60 each when a commercial rifle sells for much less."

We hope he found out, but just in case he didn't we could tell him that the reason why a Springfield rifle costs the Government \$60 when a commercial rifle costs much less is that the manufacturer of the commercial rifle has to work with his own capital and can survive only through making an article that he can sell to the public at a profit and in competition with other manufacturers who have to do the same thing, whereas the manufacturer of the Springfield rifle is linanced by the Government and the Springfield rifle is not sold in competition.

It is obvious that when our country engages in war we must have all the supplies and materials we need, and have them as fast as we need them. Unfortunately, from a standpoint of economy, this means that practically everyone who can make anything that is needed for the prosecution of the war is expected to engage in the production of the item without regard for economy; it is understood that the Government will pay whatever seems necessary. Under such conditions the element of competition is removed and the manufacturer is not too interested in keeping costs down.

Without question evils have derived from this situation, else why should girl workers receive as much as \$73 a week for assembling oil pumps or \$67 a week for welding? Mr. Engel discovered that farmer boys without previous experience have been earning \$60 to \$110 a week on war production and gun assemblers have been drawing from \$90 to \$160 a week.

If these high wages were the reward of extra hard work and high production under an incentive system, I am sure that neither Mr. Engel nor anyone else would have any complaint to make. But the fact is that thousands of these workers move as though they expected to be shot at the completion of each task. The difference in the attitude of the workers on war production and workers working for an employer whose survival depends upon profits is immediately apparent to even an untrained observer. And more is the shame, because the safety of our nation and the freedom and liberty of each and everyone of us may depend upon the production of fighting materials in sufficient quantities and soon enough to meet the need.

The National War Labor Board recently gave its first approval to an incentive pay system on war work-and therein should lie the answer to the whole problem. "Incentive payment" simply means getting paid for what one can produce. The manufacturer himself operates under an incentive system; buyers pay him by the piece for the goods that he manufactures, whether he is making and selling needles, shirts, or locomotives. If he cannot operate his plant at a cost which will enable him to market his products in competition with other manufacturers and make a profit, he is out of a job. That same system should apply to the members of his manufacturing organization. Every production job should be operated under an incentive system of remuneration whereby the worker would get paid for what he produced-not for the time he put in at the plant regardless of results.

An incentive wage payment system properly handled does not necessarily result in a smaller pay envelope but definitely assures a given amount of production for the wage that is paid. The wage

(Continued on page 395)

Keep this Point in Mind

FEATURES of SUPERIORITY

Simple Design Parassion Built Heaves Dury Built Bearing for Greater Thrust Load Neary Dury Roller Bearing for Greater Rodiel Load Needle Bearing for True Running Lorge Spinille Small Head Shert Overheam Locking Feature for Redressing Forst without Diseasembling. Loving Desirable — United Shert Overheam Cont Thrust Paid Discaled — United Shert Desirable — Cont Thrust Paid

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there still are years of service if run at rated loads and speeds.

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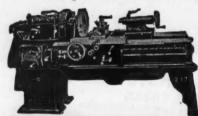
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They need no introduction to experienced machine shop men. Their many exclusive features enable the operator to reduce operating expenses and more than earn their cost in a short time. Our close co-operation with many of the leading plants everywhere has helped solve perplexing lathe problems for boring, turning or chasing any metal work always most economically.



Latest catalog contains detailed specifications on 14", 16", 18", 20", 22", 24", 27" and 30" sizes. With them are obtainable 32 to 96 changes of thread and feed; 12 to 24 spindle speeds by simply lifting the lever to cover every shop requirement. Whether in tool room or manufacturing plants, CINCINNATI LATHES give most remarkable performance.

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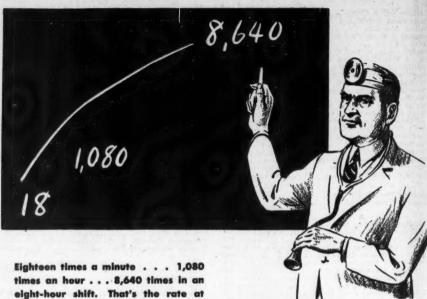
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DIVISION OF THE R. R. LI BLOND MACHINE TOOL CO., CINCINNATI, OHIO

MADISON RD.

July, 1943

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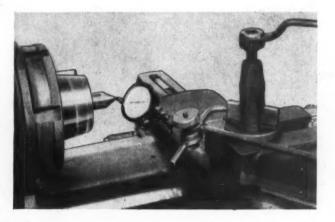
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that's the way your lathe spindles should run to turn out a good job—in a straight line Centers can get out of whack, even the best of them, under continued hard use. We call it "run-out" when the headstock center rotates out of line

"Run-out" shows up easily if you use a dial type indicator measuring in thousandths of an inch. Here's how to detect and correct it.

Mount the dial indicator on the tool post with the point against the angle of the lathe center Fluctuation of the needle when the spindle is turning indicates "run-out" Three things may be responsible



likely to be the fault is the of dirt or chips in the taper een spindle and center bushing in center bushing and the center move the center and clean the taper holes in the d center bushing and the out-th center bushing and center.

2—A second source of trouble may be a burr or scratch on the surface of the spindle taper hôle or the center bushing. Since the center bushing is hardened, the burr is most likely to be in the spindle hole. In this case, remove the high spot with a scraper or use a Morse taper reamer of appropriate size.

3—Third cause of "run-out" is inaccuracy of the center point itself. Soft centers can be trued up by setting the compound rest at 30 degrees with the axis of the lathe and taking a skim cut with a sharp tool. Hard centers require grinding. Use a tool post grinder or a LeBlond grinding attachment, mounted at 30 degree angle.



1943



HOLO-KROM

Modern Machine Shop

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Shown above is an Atlas 10-inch lathe as used by many manufacturers on production work. With the spindle mounted on Timken Bearings it is capable of turning out a wide variety of small parts to close limits of accuracy at consistently low unit cost.

Precision knows no size limits when lathe spindles are mounted on Timken Tapered Roller Bearings. Thus bench lathes match big tool room machines in precision performance. For big or little, Timken Bearing Equipped spindles are consistently rigid and free from chatter; smooth in operation; and proof against radial, thrust and combined loads. Do your machine spindles possess these advantages? The Timken Roller Bearing Company, Canton, Ohio.

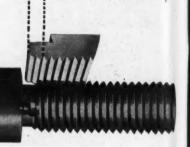


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LANDIS CHASERS PERMIT "CLOSE-TO-SHOULDER THREADING THROUGHOUT ENTIRE LIFE

The length of Chaser Throat (remains per



12 Features of the LANDIS TANGENTIAL CHASER

1-Permanent threat permits close to shoulder threading throughout life of chasers

2-Rake angle range covers all machin-able materials

3-Free cutting condition permits maximum cutting speeds

4-Simple grinding operation renews en-tire cutting edge and leading feature

S-Line contact with work lessens fric-tion and minimizes thread distortion 8-Leading feature insures thread of accurate lead

7-Lateral absorption of cutting strain reduces vibration and chaser breakage

8-Right and lefthand threading feature reduces chaser equipment

9-Standard chasers thread all diameters with proper chaser holders

10-Interchangeability of chasers lowers operating cost

11-Chaser length provides exceptionally long life and low tool cost 12-Permanent threat gives equal dis-tribution of cut

When regrinding the chasers, the entire cutting edge is renewed without increasing the length of the "bevel" or throat. The throat of Landis chasers is never reground. Thus, "close-to-shoulder" threading is permitted throughout the entire life of the chasers.

The cutting edge is always directly on cutting center regardless of the overall length of each individual chaser. The cutting position is not affected by regrinding.

The Ginest Thread Cutting Tool in Industry

WAYN€SBORO, PA., U.S.A.

THREADING MACHINERY—THREAD CUTTING DIE HEADS—COLLAPSIBLE TAPS

August, 1943

Free ha short to bide to creased as fast because

lost in result o longer and reg obtaine lapped

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August

TO GET MAXIMUM TOOL LIFE PLUS PRODUCTION -- ACCURACY -- FINISH FROM YOUR BORE-MATIC TOOLS





Your single point carbide tools can be quickly lapped exactly to required specifications on the Heold Tool Sharpener — make a few simple edjustments, flick a switch and your tool is correctly lapped, automatically.





The personal element is bound to be reflected in tools ground free hand. Exact tool shapes are impossible to produce. Undesirable irregularities in the cutting edge cannot be availed.

Free hand grinding of single-point cemented carbide tools will cut short tool life - and lower production, too. By correctly lapping carbide tools on the Heald Tool Sharpener tool life can be greatly increased since a lapped edge is keener, cuts longer, doesn't break down as fast as a ground edge . . . valuable tool material is conserved because more pieces are produced per sharpening, less material is lost in sharpening . . . better accuracy and finish are obtained as a result of the lapped edge cutting more smoothly, holding its contour longer . . . production is boosted because time lost in resharpening and replacing tools is measurably reduced. Such results cannot be obtained by grinding tools free hand - they must be mechanically lapped on a diamond wheel. Only by positively controlled diamond lapping can absolute regularity of cutting edge and exact nose radii, rake, shear and clearance angles be consistently reproduced. The Heald Tool Sharpener is designed to sharpen tools this way - quickly and inexpensively. Complete details gladly sent on request.



Photomicrograph of toal point lapped with fine grit diamond wheel on Heeld Teel Sharpener. Magnification 100X. Nets the absolute regularity of cutting edge. This means longer toal life, better finish and accuracy, increased production.



Photomicrograph of tool paint greend free hand with fine obrazive wheel. Magnitics tion 100X. Tregularities in cutting edge result in localized stress concentration, then breakdown of the cutting edge and rapid weer.

THE HEALD MACHINE CO. WASS COSTER



"It was exactly ten o'clock. I know, because I'm sittin' there with my brother-in-law and his wife, and they just got through sayin' it's ten o'clock and they better get home, when suddenly the lights go out. 'That's funny,' I says. 'Yeah, must be something the matter,' my brother-in-law says, 'call 'em up and ast 'em.' So I'm huntin' for the phone, and nearly break my neck when I step on the kid's doll, and then I pick up the phone and there don't nobody answer.'

With some such homespun speech as this would many an American commence his version of the Great Catastrophe of 1943 - if by some freak of natural phenomena every electric line in the country should

suddenly go dead.

Imagine, if you can, this entire nation without electricity, barely 70 years after the first electric lines appeared. "Brother, I want to tell you that was one hell of a mess," the sidewalk historian would go on to say. And he'd tell how industry, without power for its electric machines, stopped dead. How transportation got tangled, and all communications were out. How food began to spoil, and fuel supplies dwindled, and

cities were without water. And how ignorance and fear fanned the growing national panic as the dread spectres, Crime, Famine and Disease swept over

Preposterous? Certainly. Yet we can think of no more graphic way of illustrating our national de-pendence today upon the electrical industry. And that entire industry — with its countless products and blessings — was made possible by a relatively few basic precision machine tools!

Jones & Lamson was in at the very birth of the Electrical Age in America, and literally millions of different parts, products and machines have stemmed from machine tools designed and developed by this

In the swiftly changing world of today, such a background as this is of great value to American industry. For it means that Jones & Lamson engineers and service men are among the best qualified machine tool specialists in America to assist your own engineers in meeting changing production problems. Call upon them!



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Profit-producing Machine Tools

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When Space is at a Premium USE A MANGER COUPLING

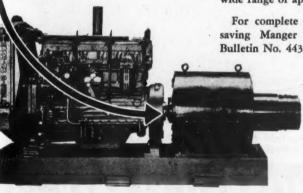
Three simple parts make up the sturdy Manger Coupling. Nested together, only half the axial space of an ordinary coupling is required.

When space for machinery is restricted, a few precious inches in axial length can be saved by using a Manger Flexible Coupling.

In the Cummins auxiliary power unit pictured below, overall length of the set is held to a minimum by bolting the coupling directly to the engine flywheel. Complete flexibility is provided . . . in approximately one-half the space required for an ordinary coupling . . . without any dummy, pilot or stub shaft.

Compensating for angular and parallel misalignment, as well as a combination of the two, Manger Couplings also permit free axial movement. Fifteen standard sizes with maximum bores from 2" to 17" provide for a wide range of applications.

For complete details of the spacesaving Manger Coupling write for Bulletin No. 443.





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THE GEAR WITH A BACKBONE

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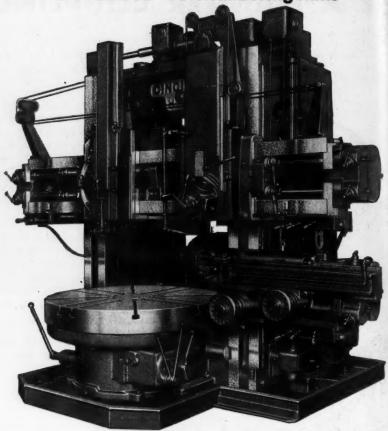
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 $T^{00\ OLD}$ to carry a gun? Well, maybe! But not too old to fight for a decent world for my grandson to live in.

I fight with the weapons America understands best-machine tools, mass production-interchangeable parts!

I make this part over and over again. It's always the same—always accurate, so that on assembly line or in the repair shop, the parts always fit—precisely!

My Gisholt and I will keep at it—making parts that are fit to fight—until the last shot has been fired.

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TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

READY-MADE DESIGN ..



Two close-up views of a CINCINNATI 10" Plain Hydraulic Grinder tailored to suit the job ... wheelhead set at a 30° angle; headstock and footstock are interchanged; automatic infeed attachment.



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The illuwith this cylinder face of the both are head unit with the finish. Ting the is equipped chance to set-up as

Our e Hydrauli

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or Tailor-Made Requirements

Many machining operations which apparently require special equipment can often be done on standard machines with a minimum of tailoring. Machines of this type offer three big advantages:

- 1. New design "bugs" have already been eliminated.
- May be changed back to standard arrangement for general purpose work when original requirement no longer exists; or perhaps used as is.
- With the wheel at an angle, an equally fine finish is produced both on the diameter and ad-

jacent face of the flange.



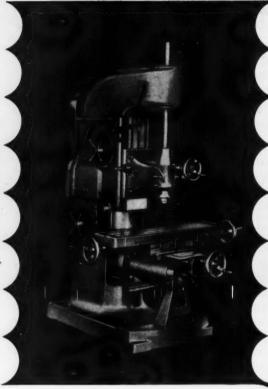
3. Lower first cost.

The illustrations at the left show how a precision grinding job was handled with this thought in mind by CINCINNATI Engineers. The part, an aircraft cylinder barrel, requires accurately ground surfaces on the diameter and adjacent face of the flange. To do these operations in the most rapid and accurate manner, both are finished in one setting of the work. This requires the grinding wheel head unit to be set at a 30° angle, so that the wheel would make a line contact with the flange (same as the diameter) and thereby produce the best possible finish. The headstock and footstock were interchanged for the purpose of directing the thrust of the cut against the headstock unit. In addition, the machine is equipped with a standard automatic infeed attachment giving the operator a chance to complete his non-productive chores during the grinding cycle. This set-up assures exceptionally close accuracy and rapid production.

Our engineers will be glad to tell you how the CINCINNATI 10" Plain Hydraulic Grinder can be applied to your center-type work.

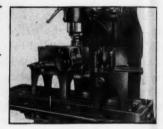
Right: CINCINNATI 10"
Plain Hydraulic Grinder. If you would like to have complete data, write to us for specifications catalog G-490-1.





EASY TO OPERATE

One Set of Simple, Convenient Directional Controls Are Grouped Before the Operator, Within Easy Reach.



In machining this odd shaped casting, the operator has a clear view of the recess and free access for checking.

• With this KNIGHT MILLER all tool changes are made at the spindle nose. Spindles are furnished with standard Brown & Sharpe taper and an adapter collet. The operator works from one position with the directional controls within easy reach and the speed and feed controls on the left hand side of the machine. These make for more efficient operation, faster manipulation and quicker set-up.

Write for Catalog



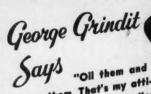
Cutting Fine-Pitch Gears on the Gear Shaper is often Less Costly than Die Stamping



Fine Pitch Gear Shaper

Fellows makes two ultra-high speed machines of 1½ and 3 inches maximum capacity, respectively, which are capable of astonishingly high production rates. This is particularly so when thin blanks are ganged on an arbor. Precision is, naturally, of an infinitely higher order than the best of die stamping processes. Every user of small gear parts should investigate the possibilities of the two machines. For descriptive circulars, write: The Fellows Gear Shaper Company, Springfield, Vermont — or 616 Fisher Bldg., Detroit, or 640 West Town Office Bldg., Chicago.

THE FELLOWS GEAR SHAPER



leave them. That's my attitude toward wheel spindles
and bearings. Yes, I know.
Sometimes they do need
attention. More often than
not they get too much."





THE LANDIS 18" RADIAL CAM GRINDER

- Recommended for all radial engine cams and certain types of Diesel engine cams.
- Used widely by manufacturers of radial airplane and tank engines.

IF YOU HAVE A GRINDING PROBLEM

Let George do it

LANDIS TOOL COMPANY

MODERN MACHINE SHOP

August, 1943

Work
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Multi Beari Whee versa Speed Misce

August,



THE CHAPTERS

Work Centers and Centers in the Work . . Work Drivers and Driving Dogs . . Work Rests . . The Diamond . Wheel Dressing and Wheel Truing . Mounting and Balancing the Wheel Granding Wheel Coolant . . Lubrication . . Multiple V Belt Drives . . Wheel Spindles and Bearings . Grinding Wheel Feed . Grinding Wheel Width . Speed of Work Carriage Traversal . . Work Speed . Grinding Wheel Speed . The Grinding Wheel . Chatter . . Miscellaneous Bit:

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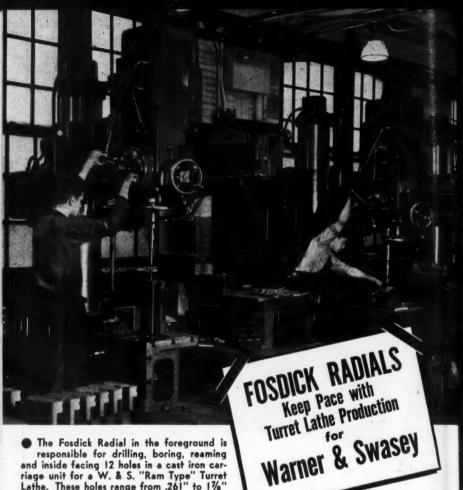
WAYNESBORO, PENNSYLVANIA

WAYNESBORO, PENNSYLVANIA

August, 1943

MODERN MACHINE SHOP

3.5



and inside facing 12 holes in a cast iron carriage unit for a W. & S. "Ram Type" Turret Lathe. These holes range from .261" to 11/2" diameter. A special holding fixture is used for most of the operations but this has been removed to counterbore a jib screw hole.

The other Radial is drilling oil holes in a cast iron saddle for a W. & S. Slide Tool. Two fixtures are used to drill, counterbore and tap eight holes in this piece.

Here again is definitely demonstrated Fosdick versatility in meeting varied requirementsspeedily, accurately and at low cost.

Your work may not be identically the samethe material may also be different-but if the job can be done on a Radial it can be done on a Fosdick.

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Main

Write for Bulletin MSR for details of construction and application. Built in six sizes from 3 foot to 8 foot inclusive.

FOSDICK

WO BEST BETS!

No. 2 TURRET LATHE

A distinguished editor and authority on screw machines recently observing a battery of Simmons No. 2 lathes in operation, wrote: "We were amazed at the number of diversified parts turned out on these machines, without what could be termed a 'special tool' in their entire set-up.

Simmons Turret Lathes are a production standby, producing close tolerance work speedily and economically. The MICRO-SPEED Drive offers unlimited speed variations, and while the spindle is in operation . . . the correct speed for any given work and cutting tools. Write TODAY for full details and delivery dates.

Equipped With MICRO-SPEED DRIVE

- SELECTOR DIAL CONTROL
- SPINDLE BRAKE & CLUTCH

Specifications

Bar Capacity-11/4" Swing over Bed-14". Swing over Cross-slide---6". Made in Plain and Back-geared Types.





No. 1A MILLING MACHINE

Because inexperienced operators learn to produce small, high-precision parts quickly with Simmons No. 1A Micro-Millers, they help solve your skilledlabor shortage. Sturdy, versatile, equally efficient on long production runs or small-lot, frequent setup work, these milling machines, through MICRO-SPEED offer an infinite number of speed variations, the exact speed for the work and cutting toolsprecision with speed and economy.

> **Specifications** SPEEDS: 64-710 R.P.M.

FEED RANGE: Horizontal, 34"; Cross 8"; Vertical, 181/2".

SIMMONS MACHINE TOOL CORPORATION

Main Office: 1745 N. Broadway, Albany 1, N. Y. New York Office: 149 Broadway



· TURRET LATHES · MILLERS · PLANERS · 6 BAR BORING MACHINES



THAT WAS THE DAY HE TALKED THE BOSS INTO "CHIP BREAKERS."

Chip Control avoids dangers and delays caused by long, hot, tough chips of alloy steel. Chip Control yields short chips that are more marketable, bring a better price,

and provide a means for speedy recovery of alloys on a national scale.

For a proved method of producing short chips with Firthite Sintered-Carbide Cutting Tools, refer to pages 41, 42, and 43 of the Firthite Users' Handbook. Ask for Handbook FE-101.

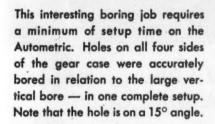


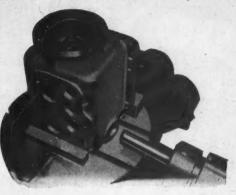
THIS JOB CAN BE BORED IN A Single SETUP

IT'S NO TRICK WITH THE

AUTOMETRIC

MODEL B





The many-purpose Autometric Model 8 is designed for today's requirements — precision boring of a wide variety of mechanical parts. It handles a complete job in a single setup—faster and more accurately. Its simplicity makes training of operators easy.

Features of the AUTOMETRIC MODEL B

- Errorless measuring by the more rapid and more accurate AUTOMETRIC Method.
- Infinite variation of spindle speeds by fingertip control.
- Infinite selection of feeds by fingertip control,
- Steel Ways hardened, ground, and super-finished.
- Spindle direct V-Belt driven free of vibration.
- Well-ribbed body casting for permanent alignment and rigidity.
 Write for full details of the Model B

Autometric Jig-Boring Machine



BUY VICTORY WITH AT LEAST 10% IN WAR BONDS

Rotary Head Milling Machine Autometric Jig Borers Center Scope Rearney & Trecker

Products

Milwaukee, Wisconsin

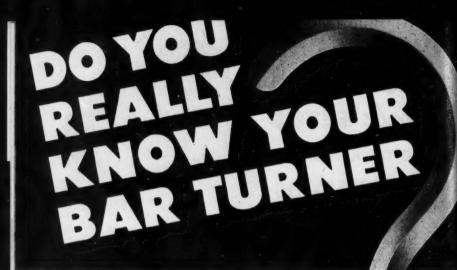
Milwaukee Face Mill Grinder Milwaukee Midgetmill Milwaukee Speedmill

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10



Here's How You Can Learn the Full Possibilities of Your Bar Turner

ONE of the most important tools employed in metal turning is the Warner & Swasey Single Cutter Bar Turner. It is used more than any tool on turret lathes set up for bar work.

Field studies in dozens of plants indicated the urgent need for a better understanding of the several fundamentals governing the setup and operation of this tool.

The information and many helpful hints assembled in the new

Warner & Swasey booklet, "Better Performance from Single Cutter Bar Turners", can improve performance of this basic turret lathe tool and increase production in your shop. shov

Sin

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&
SWASEY
Turret Lethes
Cleveland

YOU CAN TURN IT BETTER, FASTER, FOR LESS . . . WITH A WARNER & SWASEY

BETTER
PERFORMANCE

from
Single Cutter Bar Turners

Just issued — new 32page illustrated booklet
shows how to make the
most efficient use of the
Single Cutter Turner on
bar work.

GET IT

QUICKLY BY

CONVENIENT

COUPON

Warner & Swasey Operator's Service Bureau, Cleveland, Ohlo Please send booklet, "Better Performance from Single Cutter Bar Turners".

Name

Address City

State

I work at (Company)

MM-10

EX-CELL-O CYLINDER BORING MACHINE

To left: Ex-Cell-O angular type machine equipped with six spindles to finish bore valve seats and valve guide holes in cylinder head of aircraft engine on a production basis. Each spindle is individually adjustable for depth of cut, as are the tools in the boring bars (boring bars, not shown in picture, are pilleted in the fixture).

SPECIAL MACHINES

For years Ex-Cell-O has been familiarly known as "the headquarters" for special single-purpose machines for turning out accurate parts at a high rate of speed and special spe

EX-CELL-O SIX-WAY MACHINE

Below: Ex-Ceil-O sixway machins for drilling, breaching and reaming valve guide heles in a megnesium trankcass. This machina is equipped with four standard hydraulic power units and two Ex-Ceil-O special hydraulic breaching units.

XLD Proceedings thread only

Parcidios Thread Grinding, Boring and Lapping Machines - Tool Grinders - Hydraulic Power units - Grinding Sprindles - Broaches - Continental Cutting Tools - Delil Jid Bushings - Diesee Fuel Injection, Equipment Pure-Pak Container Machines - R. R. Pins and Bushings - Precision Tarts

EX-CELL-O for PRECISION

20

American

GRINDING WHEELS



for High Accuracy

Slaughterer of Axis dive bombers, the rapid fire anti-aircraft gun translates the accuracy of production into the deadly accuracy of firepower. "American" Grinding Wheels do their part to maintain this accuracy, grinding striker pins, breech blocks, breech block mechanisms, gun barrels and other parts—also the cutters, hobs, drills and other production tools. Throughout America wherever grinding must be done right...on time all the time...there you'll find "American" Grinding Wheels!

Let us know your grinding requirements.



AMERICAN EMERY WHEEL WORKS

ESTABLISHED 1898

PROVIDENCE

RHODE ISLAND

A HIGHLY DEVELOPED LINE...



MA 8—Eight speeds. 1200 to 12,000 R.P.M. Small work up to ¾". Built-in motor. Bench and column types. 1 to 6 spindles.



Type B—No. 1, No. 2, No. 3 sizes. Hand feed drilling units. Hand feed tapping units. Power feed drilling units.



ONLY years of steady development can evolve the drilling equipment that is found in the Avey Line of Sensitive Drilling Machines.

The edvances required in machining methods caused by the demands for greater output, necessitated more efficient drilling equipment. Avey Drilling Machines have steadily led the field.

Avey High Speed Sensitive Drilling Machines are built-in types and sizes to cope with varied needs. They are designed in capacities from the smallest drill gauge size to approximately 1½ lackes.

Seing ball bearing throughost, they rate the highest speeds withset vibration. This feature insures meintained accuracy.

The Avey Catolog details the line of Avey Drilling Machines and Drilling Machine Accessories.

Avey Engineers will come to your aid in solving new and different drilling problems.

individual Motors for each Spindle. Single and Multiple Spindles.

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DRILLING MACHINE CO.
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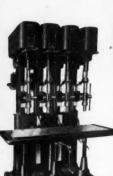
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MA 6—Six speeds. No. 2 and No. 3 sizes. Built-in motors.



Belted quick speed change machine. No. 2 size. Four speeds. Standard frame motors.



THE AVEY DRILLING MACHINE CO. Cincinnati, Ohio, U. S. A.

> DRILLING MACHINES

So-swing IMP LATHE

A Small Automatic Capable of High Speeds, Fine Finishes and Extreme Accuracy

♦ The IMP is intended primarily to handle work demanding high speeds (up to 5000 R.P.M.) and extreme accuracy, but its sturdy, compact design makes it likewise suitable for turning heavier work such as small pistons, bushings, gear blanks, etc. It incorporates such modern features as: Seneca Falls built-in Change-Over Mechanism; positive operation of Third Slide and Back Attachment by self-contained drum cam; antifriction bearings, and automatic lubrication to all bearings including carriage ways.

The Lo-swing Imp, because of its integral unit design, lends itself to practically unlimited tooling possibilities. Two types of heads are available depending upon spindle



speed required. A geared head used for lower speeds and dire drive for higher ranges. A Third Slicor Over-arm for additional facin grooving or chamfering operatio—either roughing or finishing—c be furnished. Automatic work he dling devices are frequently us with this machine.



SENECA FALLS Automatic WORK DRIVER

Self Centering... Quick Acting... No Slip. Attaches to any chuck plate or spindle. Provides a positive, balanced drive which reduces chatter. Handles rough forgings or turned pieces — straight or taper. Eliminates dogging time. Reduces tool breakage. Write for details and size range.

SENECA FALLS MACHINE CO. SENECA FALL



The newly revised 1943 edition of our book "United States Government Specification Finishes" will soon be ready for distribution to those interested in wartime finishes. Reserve your copy today. Please address Dept. MM

EGYPTIAN Victory "Spec" Finishes

As the world map changes and the black areas happily grow smaller, radical changes occur in war equipment.

Not yet are we ready to beat our swords into ploughshares. But tanks are giving way to locomotives, old contracts for certain parts are not being renewed; we are approaching the saturation point on instruments, small arms and camp equipment. Contracts are being let for needed new and different materials.

As the battle fronts change, so change the production fronts—and the finishing fronts.

New and revised Finish Specifications for wartime equipment will shortly be issued. And as usual EGYPTIAN will be ready to meet them!



THE EGYPTIAN LACQUER MANUFACTURING CO. ROCKEFELLER CENTER-NEW YORK, 20, N. Y.

YPTIAN erior FINISHES

in less time

More and more men who have tight schedules to maintain are using Nameo Circular Chaser Die Heads. They will tell you that these tools will turn out more work—per hour or per day. Class 3 threads, too, on a production basis.

Chasers are reground on blocks. Inserting a duplicate set in head is a two-minute job, and you are ready to cut identical threads, without "trying for size" and without work spoilage.

In the same rigid head, circular thread chasers may be interchanged with hollow milling cutters and blocks.

Capacities: .056" to 4\%"—revolving or stationary type. Send for Catalog D-42.



Namco Micrometer Gauge

determines correct amount of metal to remove for Circular Chaser grind, and double-checks precision after grinding.



Namco Circular Chasers

may be ground through 270° of circumference They last 10 to 30 time longer, with no loss of precision.

NATIONAL ACME

ALUMINUM

FORGING

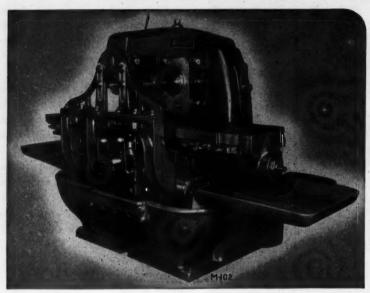
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ACME GRIDLEY 4 6 AND R. SPINDLE BAR AND CHUCKING AUTOMATICS - SINGLE SPINDLE AUTOMATICS - AUTOMATIC THREADING DIE AND TAPS - THE CHRONOLOG - LIMIT AND CONTROL STATION SWITCHES - SOLENDIDS - CENTRIFUGES - CONTRACT MANUFACTURIN



IMMEDIATE SHIPMENTS NOW



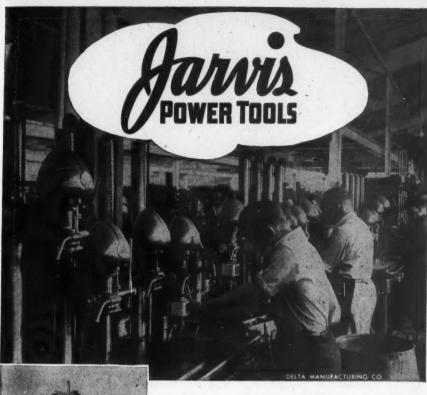
Its convenience and accessibility make the Ohio Production Milling Machine versatile and profitable. On short runs it is easy to set up, operate, get at, and change over. Long runs prove it rugged, accurate, and enduring.

The machine mills just as well against the feed as with it, thanks to true cutter rotation, a true plane of travel, rigidity, and positive locked feed. You can mill continuously without indexing fixtures. Climb-cutting prolongs service. Available are various cycles of automatic operation of the feed and rapid traverse.

We are shipping orders promptly now. Better indicate your requirements without delay.

THE OHIO MACHINE TOOL COMPANY, KENTON, OHIO

OHO DREADNAUGHT.
HORIZONTAL BORING, BRILLING AND MILLING MACHINES - SHAPERS - PLANERS



JARVIS TAPPING ATTACHMENTS

drilling . . . countersinking . . . and TAPPING
In a continuous flow. No waste motion.
No additional handling of parts. Jarvis
Tappers — THE STANDARD on your
multiple spindle drill presses. Capacities from No. 2-56 to 2".

THE CHARLES L. JARVIS CO., MIDDLETOWN, CONN.

TAPPING ATTACHMENTS . FLEXIBLE SHAFT MACHINES . GROUND ROTARY FILES



For Tapping brass, bronze, aluminum, plastics, cast iron or steel—the wide range of Winter Brothers precision-built taps will insure top production results—rapidly and accurately.

The Winter Tap Data booklet offers some practical suggestions in selecting the proper taps to use in these materials—and THE RIGHT TAP IS IMPORTANT in producing smooth-finish threads. Send for your copy today.

Always specify the material in which taps are to be used, so we can help you do your thread cutting quicker and better.

A DIVISION OF

THE NATIONAL TWIST DRILL & TOOL CO.

DETROIT, MICHIGAN

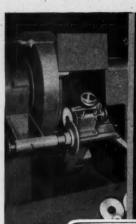


For "All-In-One" FINISHI DE-BURRING, POLISHING

- Bridges the gap between a grind and a buff. Does not load, gum or fill.
- Works metals with minimum dimensional loss. Requires no special preparation.
- Gives a precision finish that frequently serves as a Made in wheels, blocks, sticks, rods — for manual

BRIGHTBOY INDUSTRIAL DIVISION, WELDON ROBERTS RUBBER COMPANY,







and this 36" GARDNER GRINDER
does it - efficiently!

he circular pieces at the bottom of the above illustrations are test slugs, or billets, cut from gun barrels, which must be ground on one face to a good finish, for etching in a steel analysis. It's a tough grinding job because of the large area involved in many of the billets.

The Gardner No. 230-36" Disc Grinder seen here, handles billets, ranging from 2¾" up to 75%" O.D., and removes about .010" to .015" stock. A quick-clamping fixture on a hand-operated lever table, is used. PRO-DUCTION: 15 to 20 per hour on an average size; say, 6¾" diameter.

Investigate GARDNER-GRINDING for Your TOUGH jobs—Ask for Bulletin 2008.

Use Modern
GARDNER
WIRE-LOKT
Abrasive
Discs on Your
Disc Grinders!

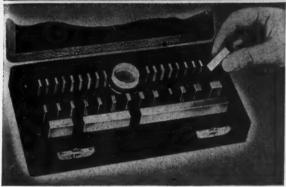


GARDNER-GRIND-YOUR Flat SURFACES

GARDNER MACHINE COMPANY

428 East Gardner Street . . . Beloit, Wisconsin, U.S.A.







Specialization in one 34 block unit enables us to offer the ULTRA-CHEX Inspectoset for \$125.00 including optical flat for checking lapped surfaces.

Ultra-Chex are indispensable for precision manufacture. They provide a shop with an absolutely reliable system of size control, a necessity wherever definite limits of accuracy must be maintained. Hundreds of prime and sub-contractors now guarantee the accuracy of their output by using ULTRA-CHEX.

The 34 blocks in the Inspectoset are as follows:

.1001", .1002", .1003", .1004", .1005", .1006", .1007", .1008", .1009", .101", .102", .103", .104", .105", .106", .107", .108", .109", .110", .120", .130", .140", .150", .160", .170", .180", .190", .100", .200", .300", .500", 1.000", 2.000", 4.000",



Checking lead accuracy of a micrometer with Ultra-Chex.

Write for 8 page bulletin describing fully the many uses you will have for Ultra-Chex in your shop.

Request also folder on Reed Micrometers.



SCHERR COMPARITOL—for checking gage blocks, gages and work for size, accuracy and wear. \$195.00



ATLANTIC ADJUSTABLE LIMIT SNAP GAGES—for accurate checkup, without having to depend on operator's skill. Sizes to 6".



MAGNI-RAY—a wide field illuminated magnifier for close inspection of work and operations, \$18.50 List.



SPENCER BINOCULARS — for detecting surface finish, imperfections, etc., by means of 3-dimensional vision. \$143.50.



WILDER PROJECTOR provides accurate measuring or comparison of objects by means of magnified shadow.

GEORGE SCHERR COMPANY, INC. 130 LAFAYETTE ST., NEW YORK, N. Y.

LOWER COST GRINDING—LONGER LIFE for Drills Ground on COVEL'S YANKEE TWIST DRILL GRINDER



RILLS are vital tools—keep them in first-class condition with the Covel Yankee Twist Drill Grinder. No special skill is required—any workman can, within a very short time, become proficient in operating the YANKEE DRILL GRINDER. The valuable time of a skilled machinist is not required, as is the case when drills are ground by hand. Grinding costs are lower and because drills are easily ground correctly by the Yankee method, efficient life of drills is greatly lengthened . . . Write, wire or phone today for complete details contained in Bulletin MM-83.



32



Official U.S. Navy Photograph

demands top national production. For maintenance of wartime schedules in MACHINING use . . .

... SINCLAIR CUT-TING OILS and COOLANTS. These oils promote higher speeds, closer tolerances, finer finish, and longer tool life. They are suited to all types of metal cutting operations.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.



SINCLAIR INDUSTRIAL OILS

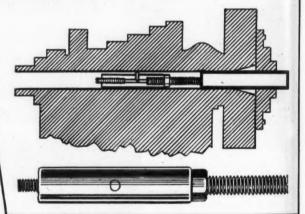
FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITS SINCLAIR REFINING COMPANY (INC.), 430 FIFTH AVENUE, NEW YORK CITY

CARLSON Spindle LATHE STOP

The Carlson Spindle Lathe Stop is designed to speed up and simplify lathe operation, especially in machining parts on a mass production schedule. When placed at correct position in spindle for first part, it automatically provides permanent set-up for remaining parts to be machined to same dimensions, regardless of quantity. The Stop can be placed anywhere within the spindle. It is fitted with an adjustable screw which can be extended out in center of chuck jaws when chuck is needed for working on small parts.

- e SPEEDS OUTPUT
- **e** REDUCES REJECTS
- . SAVES SET-UP TIME
- · ASSURES ACCURACY
- REQUIRES ONLY
 SEMI-SKILLED LABOR

The Carlson Spindle Lather Stop can be installed in a few minutes. When order few minutes. When order and model of lather also specify inside diameter of lathe spindle.



MODEL No. 101 — Inside diameter ¾-inch fits South Bend, Logan, Atlas, Sheldon, and other make benchtype lathes. PRICES ON OTHER SIZES FURNISHED ON REQUEST 595

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SCHULTZ & ANDERSON CO.

109 EDISON PLACE, NEWARK, N. J.

MANUFACTURED BY GREENFIELD MACHINE & TOOL WORKS

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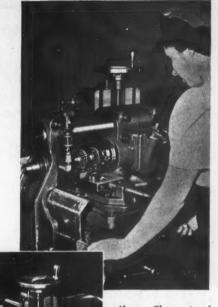
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L.S. multi

popular ProductionTool in the AircraftIndustry

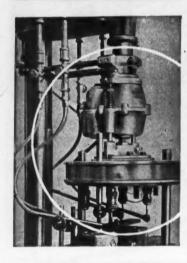
A battery of these U.S. Multi Millers is in continuous operation at a well known aircraft propeller plant which supplied the photograph at the left. This close-up view illustrates the action of four milling cutters which simultaneously form mill the two vital aircraft propeller parts visible in the vise. One of the outstanding features of these machines is the cam controlled table action, the basis for obtaining extremely close "aircraft" accuracy limits . . . for fast approach . . , for completing the cut at the most effective cutting speed . . . for a fast return . . . for the conservation of labor. Many applications of the U.S. Multi Miller include the synchronization of the vertical motion of the spindle head with the table cam feed so that two level milling-angle cuts-contour cuts, etc., can be accomplished with convenience, speed and extreme accuracy. These are but a few of the production advantages of the U.S. Multi Miller; complete details illustrating all features of this versatile tool are listed in Bulletin 60S. The U. S. Tool Company, Ampere (East Orange), New Jersey.



Above: Close - up of U.S. Multi Miller cuiting action in the bigh speed production of Aircraft Propeller Parts. Four miling cutters produce two finished parts simultaneously. Left: The U.S. Multi Miller set up with binged fixture for the milling of contours. Note sturdy support for extreme rigidity.



WHAT EVERY PRODUCTION EXECUTIVE SHOULD KNOW about the Ettco-Emrick system of MULTIPLE DRILLING and TAPPING HEADS



A typical Etico-Emrick Multiple Tapping Head for tapping 6 holes simultaneously. A Quill Clamp is supplied with every Head to assure the rigidity needed for high precision work. The same gear case assembly is used for drilling the holes. It's a system that assures you of maximum production on parts in which holes must be drilled or tapped.

It is based on the exclusive Ettco-Emrick Multiple Spindle Heads, made entirely of standard stock parts which can be arranged to tap from 2 to 12 holes simultaneously, depending on hole sizes and center distances.

Each Head is engineered to handle a specific part in such a way that all of the required holes are drilled or tapped simultaneously in one or more of the parts.

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RANGE OF THE SYSTEM — High Speed multiple drilling of holes from wire sizes to ½" inclusive—and multiple tapping from machine screw sizes to 5/16" inclusive.

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For the first time—a complete Master Set of standard plug gages for hole inspection, including 147 plugs and 4 handles. Plugs are set in increments of 1/64ths, starting at 1/4" and going to 1". There are three plugs of each nominal size—.0005 over, standard, and .0005 under.

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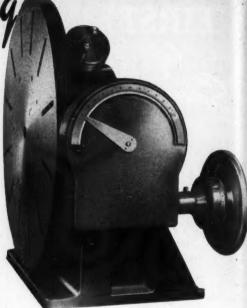
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Once the work is fastened onto the 36-inch table, it can be entirely checked for all its angles without disturbing the original clamping. The table can be rotated to any degree, and can also be set at any angle from the vertical to the horizontal, and even 30 degrees below in the opposite direction. Graduated dials register degrees and minutes, with a 10-inch sine bar provided for closer settings. All can be locked in fixed position.

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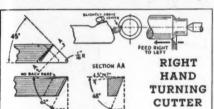
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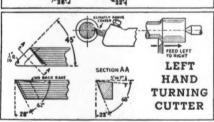
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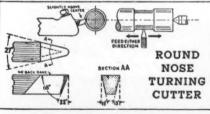
GRINDING CUTTERS FOR WILLIAMS' TOOL HOLDERS

DATA SHEET A, covering Turning, Cutting-Off and Threading Tools for machining cast iron and steel.

• Since a correctly-ground cutter bit is essential to good lathe work, the following instructions are offered to users of Williams' Tool Holders as representing our recommended practice for general machine work with the high speed steel cutters furnished with Williams' Holders. If, after grinding, cutting edges are honed with an oil stone the bit will cut better and last longer.

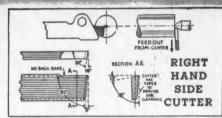


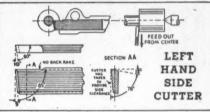


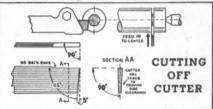


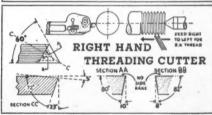
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Additional Bata Shoots on the subject of grinding other cutters for Williams' Tool Holders

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The high hook lift-low headroom feature of Northern Electric Hoists will add 12" to 36" to the working height of your building—without extra expense—without altering the building. This means better use of storage space, easier handling of bulky loads, faster operation because clearances are greater.

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.0001" Tolerance on 4 Sides

In one modern Pennsylvania plant keys ranging in size from 1/4 to 11/5" wide and from 1/5 to 3/6" thick were ground to give a .0001" tolerance on 4 sides over all. There was only 1 reject in 2500 pieces.

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Here's a direct drive Surface Grinder with 1140 square inches of hand scraped bearings and mechanism safely sealed inside. A magnetic chuck holds work firmly bithout clamps. Vibration is practically nil because the DO-ALL sturdily built—weighs more than a ton. Adaptable to wet or dry grinding. Comes in 2 models. You'll like the DO-ALL—it's easy on the operator, easy on the work and easy on your budget. It will turn out super-smooth jobs for you in quick time and has a ruggedness that will stand the gaff of continuous operation long after other equipment has given up the ghost.

Send for data about the two DO-ALL models.

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DEPT. MM, SAVAGE, MINN.

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A Boring Cutter ground on the DO-ALL Two cutting adges ground to .001 Clearance and step-down ground to .002. Keyway ground from side to side to .0001.

Fixture used to hold the Boring Cutter to 45° angle, telerance held to



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SMOOTHER FINISH FASTER FEEDS LONGER TOOL LIFE LESS POWER REQUIREMENT

The new Ingersoll SHEAR CLEAR face mill is a patented milling cutter designed to cut continuous chip materials such as steel,

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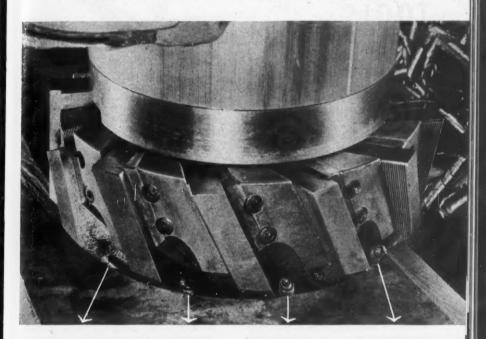
finished surface. Often this eliminates a fisishing cut.

Blades are set in the housing at negative rake and steep positive shear angles. The corners of the blades are chamfered. Actual cutting is done on this bevel portion of the blade which reduces impact load of blade entering work (See insert). This cutting action extends blade life between grinds and reduces power requirements.

A NEW DEVELOPMENT IN FACE-MILLING

This action picture shows the new Ingersoli SHEAR CLEAR face mill taking a deep cut in steel and the models below illustrate how Shear Clear chip is formed.

Note how chip is forced to coil out along the blade away from finished surface and is thrown clear of cutter at end of cut. This eliminates packing of chips in face of cutter, permitting higher feed rates and preventing scoring of finished surface.



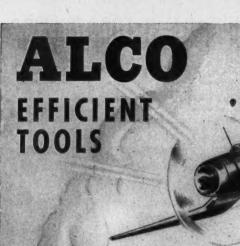




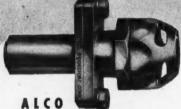




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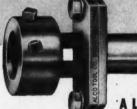


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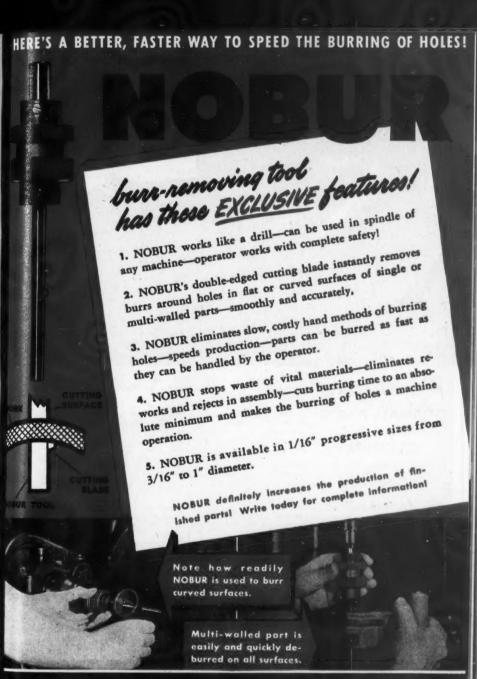
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FOR 20 MM
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Due to the extremely close tolerances required, the delicate touch of a woman's fingers is of real benefit on this grinding operation. Formerly four operations were required to grind each side and the top and bottom of the bolt for 20 mm. Cannon.

Now this is accomplished in two operations on a Thompson B Type Grinder, by means of a fixture holding the piece at a 45 deg, angle, which grinds from the periphery of the wheel. A special form-grinding attachment is built into the machine for dressing the wheel.

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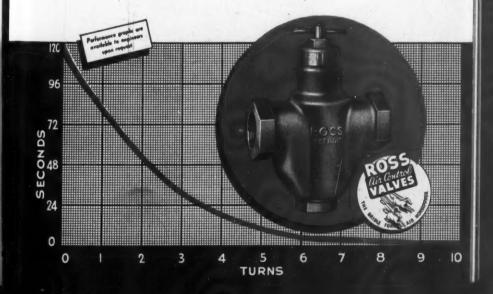
A greatly increased range of piston speeds is obtainable through control of air flow from maximum down to zero.

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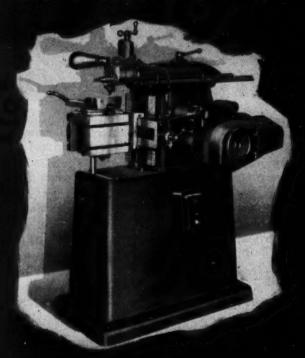
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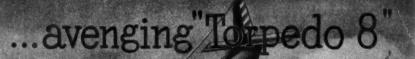
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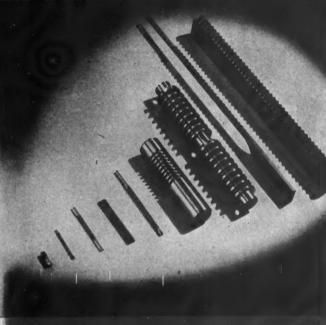
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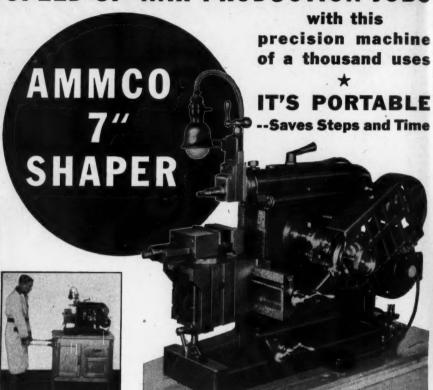
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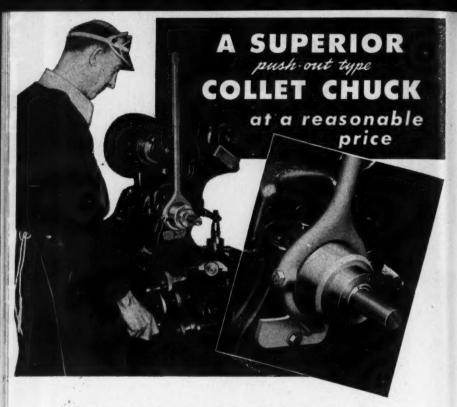


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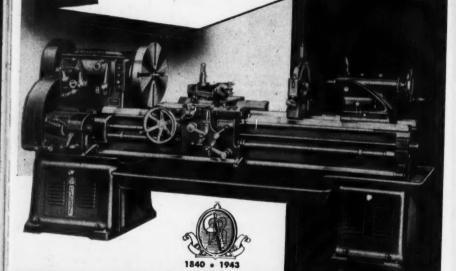
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Today, a vast majority of our industrial plants still are without any means of maintaining accurate combustion control.

It is to these plants that Cities Service Oil Companies now offer, without charge or obligation, a complete combustion control test with the unique, new Cities Service Industrial Heat Prover. This service is available on request in most of the important industrial cities East of the Rocky Mountains.



THE CITIES SERVICE INDUSTRIAL HEAT PROVER—a new, accurate combustion analysis instrument—developed by the Cities Service Research Division to enable those engaged in the oxygen control of furnace atmospheres to achieve greater combustion efficiency at less cost.

The Cities Service Industrial Heat Prover has been thoroughly tested on practically every type of combustion equipment in this country and with every kind of fuel.

It has been adopted by users of steam power plants, open hearth furnaces, cement kilns, heat-treating apparatus, crucible furnaces and internal combustion engines.

Accurate combustion analysis made as a result of the Cities Service Industrial Heat Prover tests have resulted in considerable savings in fuel costs, have reduced repairs and replacements on furnace linings, crucibles and refractories due to flame corrosion . . . and have led to increased production of better and more uniform products.

To arrange for a Cities Service Industrial Heat Prover test in *your* plant, write to Room 1673, Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

A member of the Cities Service engineering staff will then visit your plant at your convenience and make a Heat Prover analysis of your combustion processes. This engineer has been carefully trained for the purpose, and has at his command extensive information gathered by the Cities Service Research Division from power, metallurgical and chemical fields.

OIL IS AMMUNITION - USE IT WISELY!



yo

You can handle jobs like these faster, more accurately—at lower cost with the SUNNEN PRECISION HONING MACHIN

ones and finishes internal cylindrical surfaces from .185" to 2.625" in diameter—with a guaranteed accuracy of .0001". Produces a super-smooth finish of 2 to 3 micro inches.

Does not require skilled labor --in many plants girls in 'teens are handling jobs in tenths.

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No jigs or fixtures needed work is held in hands. Relieves big internal grinders for other jobs.

Low in cost, economical to operate. Fast — can be "set up" for any size in its range in less than a minute.

Let a Sunnen engineer check your job in your plant with this equipment—or write for bulletin giving complete information.



Navy "B" waves over the Sunnen plantthe Sunnen plantevidence of the important part Sunnen equipment is playing in the wer effort.



Carbureter Idler Valve Jet. Hole is honed after reaming for smooth action.



Cast Iran Valve Stem Guide. 1/2 to one thousandth removed — 220 pieces per hour. Better finish and straighter hole.



Roller Bearing Outer Race. Finish improved from 12 micro inches to 2 micro inches.



Idle Control Valve Seat. Due to large "windows," almost impossible to get straight round hole by grinding. Sunnen solved the problem.



Bearing. A very small part. 2 micro inch finish necessary.



Hydraulic Valve, Previous method of grinding threw radius on edge of "windows." Sunnen having eliminated trouble.



Aircraft Valve Tappet Roller, Honed after grinding to give 100% bearing surface,



Hydraulic Matering Valve Stem. Hole 156" in diameter; reamed, heat treated, and then honed. Honing 3 times as fast as previous method.



Wing Brachet. Two 1/1" holes must be in line. Honing increased bearing surface and reamer life.



Stainless Steel Load Compensate Valve Seat. Hole is honed s



Aircraft Hydraulic Brake Cylinder. Honing three times faster than lopping—and gave a straighter



Hydraulic Two-Way Control Valve, Hole is haned to eliminate leakage.



Aircraft Instrument Panel Contral Wire Bushing. Note .187" diameter—held to .0002", stack removal .001", Counterbore Cutter, Very small part and because



Pump Shaft Bushing, Brantus honing follows reaming, Sunnon method greatly reduced valve leakage.



Calculator Machine Gears. Cul from hale which is reamed and then haned. Haning maintains same pitch line concentricity.



Aircraft Valve Guide. Valve tappet raller pin hale haned to 6 micro inch flaish.



Header Die. Life of header dies increased 3 to 9 times over lapping. Knock out pin brookage practically eliminated.



Carbureter Metering Jet. Two black bushings Bakelite. Line honing by Sunnen method.

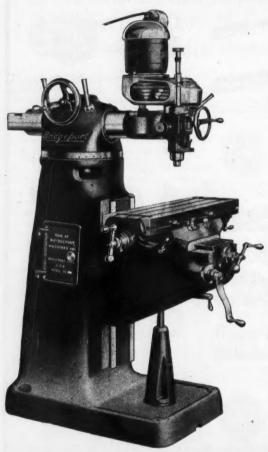


from heat treatment, concentricity of pitch line is maintained.

SUMMEN

SUNNEN PRODUCTS COMPANY, 7933 Manchester Avenue, St. Louis, Mo.

Bridgebort



TURRET MILLING MACHINE

Flexibility Rigidity Unparalleled Range

N outstanding product weighing 1600 lbs. with unusual range for large tool and fixture work yet extremely sensitive for fine milling on molding dies.

Also, high speed milling attachments for all makes of milling machines.

Write for further details.

BRIDGEPORT MACHINES, INC.

52 REMER STREET

BRIDGEPORT, CONN.

TOOL POST and TAIL STOCK LATHE TURRETS

JEFFERSON

Change Any Engine Lathe To Turret Lathe in 15 Seconds

You can change any engine lathe into a complete, precision turret lathe with the Jefferson Tool-Post Turret, Tail-Stock Turret and Adjustable Pull Feed ... and double its productive capacity.

Tail-Stock Turret accommodates five tools and each tool centers automatically when brought into position by means of an indexing plunger. Made in four sizes to fit small bench lathes up to lathes with 24" swing.

Tool-Post Turret carries four separate tools instead of one. Made in two sizes for standard 0, 00, No. 1 and No. 2 tool holders.

Adjustable Pull Feed eliminates slow movement of tail-stock spindle and provides easy control. For any lathe up to 24" swing.

Delivery, 6 days. WRITE FOR FOLDER.

Illustration below shows Jefferson Attachments on 16" lathe.







JEFFERSON MACHINE TOOL CO.

Tool-Post Turrets, Tail-Stock Turrets, Adjustable Pull Feeds, Bell Sanders, Gyratory Foundry Riddles, Overhead Swing Frame Grinders, Milling Mashines, Dividing Heads and Vises.

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UNION TWIST DRILL COMPANY

STORES MASSA

New York - - 61 Reade St. Chicago - - 11 S. Clinton St. Detroit - - 6540 Antoine St. San Francisco – 121 Second St. Los Angeles – 524 E. Fourth St. Seattle – 568 First Ave., South

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Aug

"MORE PRODUCTION, BETTER FINISH, REJECTS
ELIMINATED—Grinding Airplane Cylinder Valve Seats"



Dear Charite:

I'm writing this from

all plant, and here's

in producing one additional air.

Plane barry with valve seats

you can see that for one out, and
doesn't like.

So long 'til hart report

your roving reporter

THE JOB:

Removing .010* to .012* from valve seats of airplane cylinder barrels on a Waddell Valve Seat Grinder—wet grinding at 5,000 R.P.M.

THE WHEEL

Por-os-way 31/4" x %" x 11/8" C80 HV3.

All facts and figures given are taken from an actual field survey made by a Por-os-way correspondent.

WRITE for complete booklet "Facts About Por-os-way". The address is 440 Wheatland St., Phoenixville, Penna.

THE RECORD	POR-OS-WAY	FORMER WHEEL
Pcs. per Hour (2 Seats per Cylinder Barrel)	5*	4
Dressings	None	3 per wheel
Pcs. Per Wheel	300-375	120-150
Life of Wheel	1½ days	1 day
Average Depth of Cut	.005"—.008"	.001"003"
Rejects	None	2%
Finish	Superior	

*Conservative. Por-os-way has proved ability to grind 8 pcs. per hour, or 100% more than former wheel.

Remarks (by foreman). "My men take pride in their work. If a wheel is too hard and burns work, it means lost time and material and gets them sore. We are sold on the merits of Por-os-way".



DOR OS WAL

POR-OS-WAY*

RADIAC* PRODUCT

A. P. DE SANNO & SON, INC.

NEW YORK, CHICAGO, PITTSBURGH,

CLEVELAND, DETROIT, LOS ANGELES



PHOENIXVILLE, PENNA.
Western Gateway to
VALLEY FORGE

PT. M. Reg. U. S. Pat. Off. COPYRIGHT, 1943. A. P. de Sanno & Son. Inc.



Safety Grinding Wheel

for

Centerless and Cylindrical Jobs, especially adapted

for

National Emergency Steels

The new bond used in No. 277 wheel is the product of Safety's Engineering Research staff. This new bond is one of our staff's outstanding contributions to the war effort.



The new No. 277 wheel is available in practically any size, shape, grit, porosity and grade of hardness. We will be pleased to quote on your requirements. Write us today.

THE SAFETY GRINDING WHEEL AND MACHINE COMPANY

SPRINGFIELD, OHIO - SALES OFFICES IN PRINCIPAL CITIES - ESTABLISHED IN 189

MANUFACTURERS OF SAFETY MOTOR DRIVEN PORTABLE GRINDERS, SAFETY RITE-SPEED GRINDERS, GRINDING WHEELS FOR EVERY PUR-POSE, INCLUDING THE FAMOUS "SAFETY GRIP-LOX GRINDING WHEELS"

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MACHINE MAINTENANCE

TOOLS

are being used to maintain efficient operation of Marine Engines used on the new

LIBERTY CARGO SHIPS

War demands have stimulated many new advancements in oTc Tools for Industrial, Marine and Automotive Maintenance—available only on high priority—until after Victory!

OWATONNA TOOL COMPANY

OWATONNA MINNESOTA





oTc

IN WAR SERVICE . LAND, SEA AND AIR

American No. 2 PLAIN MILLING MACH



for SPEED. ACCURACY AND VERSATILITY

> ARMAMENT PRODUCTION

ISC

PROMPT DELIVERY

Spindle is heat-treated chrome-nickel steel and runs in heavy phosphor bronze bearings compensated for wear and equipped with alemite lubrication fittings. Standardized flange spindle nose has No. 40 taper. Controls for speed and feed are centrally located for ease of operation.

Table working surface....46" x 101/4" Longitudinal power feed......25" Max. distance spindle to table.....19" Number of geared feeds......16
Range per spindle
revolution...........005" to .212"

UNIVERSAL MODEL ALSO AVAILABLE

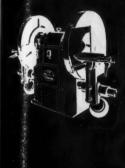
WRITE FOR FOLDER

L. LUCAS & SON, INC.

BRIDGEPORT

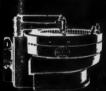
CONNECTICUT

ISC GRINDERS BECOME REAL PRODUCTION TOOLS



when equipped with Besly Titan Steelbac Abrasive Discs. This modern Bolted-On Grinding Member with 1", 2", or 3" useable Abrasive is fast, cool cutting, safe, economical and easy to mount.—In Stud Type and Nut Inserted. Always made of Resinoid Bond.





The Besly Titan Steelbac has been adopted by many prominent users of Blanchard and Pratt & Whitney Type Grinders. The Besly Titan Steelbac has eliminated the sulphuring operation and waste incidental to such procedure. You get 3°, 4° or 5° of useable Abrasive when you specify Besly Titan Steelbacs for your Blanchard or Pratt & Whitney Type Grinder.





If you operate a Traveling Table Grinder of the Bridgeport Diamond or Safety Type it will pay you to investigate the advantages of Besly Titan Steelbacs on that machine. Used in connection with such



Write for your copy of Bocklet on Besly Titan Steelbacs.

Grinders, they eliminate heavy Ring Wheel Chucks and wasteful stubs. Besly

Titan Steelbac Abrasive Discs are furnished in various grains and grades, also proper density depending on the particular application.

CHARLES H. BESLY & COMPANY
18-124 NORTH CLINTON STREET * CHICAGO, ILLINOIS

WAGNER PRODUCTS SPEED VICTORY!

THOROUGH INSULATION

IS ONLY ONE OF THE MANY REASONS WHY

Wagner Stay on the job!

The illustrations on this page show typical polyphase stator windings. The stator cores of all Wagner polyneme motors are well insulated, using special shot place motors are well insulated, using special shot cells formed from tough fibrous material, cuffed on a cells formed from the state shope and free ends cells and free ends are shaped to fit snugly into the slots so that there is no possibility of vibration and at the same time the windings are easily put into place. Heavy separators are used between the coils in the slot and inverted are used between the coils in the slot and inverted used to the state of the state of the windings are completely taped well into the slot cells, and heavy sheets pletely taped well into the slot cells, and heavy sheets of black varnished muslin are slipped between other of various phases to insulate them from each other.

After the windings are in place, the stator is baked to remove all moisture, and while still hot it is immersed in a heavy insulating varnish. When the heated stator care is immersed in the When the heated stator care is immersed in the produces complete impregnation of the windings. The stator is immersed long enough seignings. The stator is immersed long enough seigning varnish the insulating varnish impregnators the interest portions of the coils. The stator is then nermost portions of the coils. The stator is then heated again until this carding is completely backed again until this carding is impregnation and to baking to insure complete impregnation and to baking to insure complete impregnation and in provide an added moisture-resisting control of the provide and deal of the stator is sprayed with air-drying Finally, which not only provides further resistance to oil and moisture, but also gives the coils a glossy surface.

WRITE FOR COMPLETE INFORMATION

Complete information on Wagner motors will be sent upon request. Wagner is a nation-wide organization with branches in twenty-nine principal cities. Each branch office is manned by trained field engineers ready to help you solve your motor-drive problems.

Wagner Electric Corporation

6448 Plymouth Avenue St Louis 14, Mo. U.S.A.
ELECTRICAL AND AUTOMOTIVE PRODUCTS



76

SHE'S

More PRODUCTION AT LOSS EXPENSE YOUR AIR TOOLS



YHY





1943

• Carefully made of the best materials, from correct designs, CLECO pneumatic tools are built to stand the service on any job. However, increased production depends upon a few simple precautions, which often have no bearing directly on the tool itself. Here are a few:

Be sure to use the right grade of oil. In general, a light oil of high quality is what you need.

Avoid abusing the tool by rough handling, permitting parts to become loose; using unsuitable wrenches, or clamping the body of the tool in a vise. Leave repairing to the regular tool repair man.

Use adequate hose and pipe lines, with traps for water and trash.

Oil the tool about once an hour when the service is continuous.

Don't remove screens in connection bushings.

Use air of the correct pressure, generally 80 to 100 pounds at the tool.



Have you sent for your copy?

The cartoons shown here are samples from our tremendously popular Cleco Cartoon Booklet, full of easy-to-remember operating instructions. Send now for your free copy.







THE CLEVELAND PNEUMATIC TOOL CO.
Branch Offices in All Principal Cities 3781 East 77th St., CLEVELAND 5, OHIO



Every tapped and threaded part that doesn't meet Army or Navy specifications - every reject - means just one more delay in war-winning production. Rejects won't win this war, nor the "war" for commercial supremacy to follow. Threads will always need to be precision cut, whether for today's armaments or tomorrow's pleasure and commercial goods.

Without boasting, without exaggeration, we can truthfully say that no tool will give you the accuracy of threads as speedily and as easily as the Bakewell Tapping Machine. Hundreds of internationally known concerns in the U.S., Canada and Great Britain will verify this statement.

PATENTED FEED CONTROL

The tapping accuracy of the Bakewell Tapping Machine is made possible by the well-known Bakewell leading on mechanism. This consists of a hardened and precision ground Bakewell lead screw operated in conjunction with electrically actuated brass guide fingers which take the place of the old style nut. These guide fingers are hobbed with the same threads as those of the tap and lead screw. The solenoid action of the fingers mates them with the threads of the screw against a spring tension insuring accurate lead of tap in and out of hole. All backlash is eliminated. Class 3, 4 and even 5 gage fits are cut in any material, soft or hard, with one pass. Taps are saved from breakage. Rejects are eliminated. A tremendous saving of invaluable time, hard-to-get labor, critical materials is gained.

If your specifications call for Army or Navy threads, check into the Bakewell Tapping Machine today.



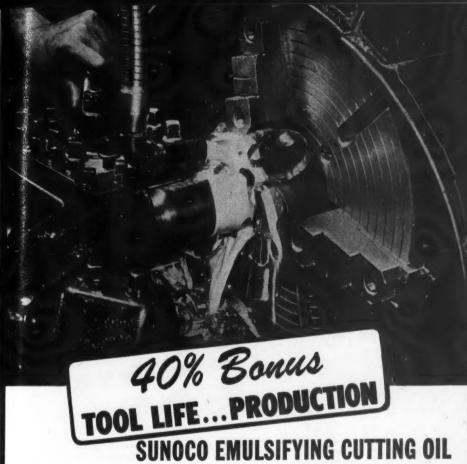
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prolongs tool life...improves finish...increases production

The longer cutting tools last on the production lines ... the more vitally needed war material can be produced for the fighting line.

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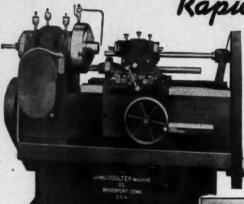
The value of the right cutting oil in prolonging tool life was amply proved by a large manufacturer of war material. When using a competitive cutting oil production was seriously slowed down because of short tool life...poor finish...and bad operating conditions. Then he switched to Sunoco Emulsifying Cutting Oil on his Warner & Swasey turret lathes. The high heat absorbing lubricating qualities of Sunoco stopped the trouble. Results... tool life and

production stepped up 40% . . . finish on parts greatly improved.

From metal working plants large and small on America's production front reports such as these are constantly being received. Facts that prove why the majority of metal working plants flood their tools and work with Sunoco to get more pieces between tool grinds, reduce rejects, and make every man-hour and machine-hour result in peak production. Call in a Sun Doctor of Industry, let him prove the production value of switching to Sunoco in your own plant. Write SUN OIL COMPANY, Philadelphia

SUNOCO:

Rapid Duplication



OI RIGHT OR LEFT HAND THREADS

INTERNAL OR EXTERNAL

COULTER



Any posts that can be held in audingry church

Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chucks, or special face plate fixtures...can be threaded on this machine.

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of feeds and speeds.

Write for complete specifications.

The James COULTER Machine Co.

BRIDGEPORT

CONNECTICUT

U.S.A.

DOUGLAS Precision MACHINES

The Douglas Miller combines rigid, well balanced design with convenience of control making it particularly suitable for accurate work in tool room as well as for general production. It is available in plain or universal type.

Showing operation with Universal Milling attachment on tool room job producing a production fixture.





Showing operation with four cutters machining alloy steel for high precision aircraft parts

FOR TOOL ROOM AND PRODUCTION

Prompt Delivery to War Plants

The Rotorex Universal Tool and Cutter Grinder will accurately perform all kinds of tool grinding operations. Readily interchangeable attachments are available.

as cylindrical, internal and radius grinding.

Operation showing set-up for internal grinding.





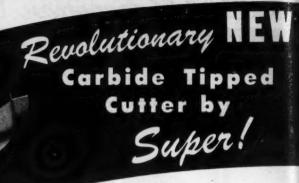
Operation showing set-up for sharpening straight gash hobs.



DOUGLAS MACHINERY CO., Inc.

150 BROADWAY

NEW YORK, N. Y.



NEW HIGH EFFICIENCY CUTTER SLASHES MILLING COSTS...

Here's money-saving news for production men! Faster milling with better finishes and greater accuracy.... at lower cost! That sums up the advantages of this new carbide tipped milling cutter by Super Tool Company....

It's fast! Feeds of .002" to .005" per tooth in cast iron and non-ferrous materials at machine capacity. Surface speeds of 400 to 800 feet per minute with tooth loads of .0005" to .0025" in steel—table feeds of 5" to 18" per minute.

It's accurate! Faster operating speeds mean less cutting pressure with less distortion of work. And the high speed of this cutter produces a fine finish comparable to a ground finish.

It's economical Initial cost is lower. It produces more and better work – faster. And it is designed to be used for slotting, side milling, face milling or half side milling without alteration.

May we send you a descriptive folder giving prices and full details?

Most Sizes
Available for
Immediate
Shipment
NOW—
others in two
to three weeks

SUPER TOOL CO.

21650 Hoover Road
Detroit 13, Mich.

4105 San Fernando Rd. Glendale 4, California

Carbide Tipped Tools

CHAMPION

15 YEARS' EXPERIENCE

DIAMOND COMPANY · NEW YORK

INDUSTRIAL DIAMONDS AND DIAMOND PRODUCTS

MUrray Hill 2-7255











Blumond Core Birs







Gentlemen:

We have made it easy to order diamond tools by showing the correct size of diamond for the grinding wheel it is to be used on.

Tool	No.	Size of	Diamond	Suggested	Wheel Size	Price per Tool
1		0.25	Kt.	A" X	in:	\$ 4.00
2		0.35	pt.	6" X	- In	6.00
3		0.50	28	6" X	ī#	9.00
. 4	100	0.60		8n x	1"	11.00
5	3	0.75	99	10% x	10	14.00
6		1.00	10	12# x	1"	22.00
7		1.25	99	14" ×	14"	27.50
8		1.50	99	16" X	14n	37.00
9		1.75	W	18# x	28	48.00
10		2.00	98	20# X	2#	56.00
11		2,50	91	24" X	3#	70.00
12		3.00		24# x	AH	88.00

Price includes setting in any type of tool such as Landis, Norton, Cincinnati, Hand, etc. Please specify.

PHONO POINTS for radius dressing of small wheels \$1.25 each

DIAMOND PENCILS for writing on glass, steel, etc. \$1.50 each

 DIAMOND POWDER graded by a new method

 any mesh to 400
 \$1.75 p.c.

 over 400 to 800 mesh over 800 to 1600 mesh over 1600 to 3200 mesh over 1600 to 3200 mesh 3.50 p.c.
 2.00 p.c.

NEW: Diamonds set in special tungsten alloy which holds then until fully used up.

3	stone	tool	\$ 9.00	each
5	stone	tool	14.00	99
7	stone	tool	20.00	-
15	stone	- 3 layers	25.00	*

Impregnated diamond tungsten tools

HEW YORK, MEW YORK

#200	\$ 9.00	each
#201	14.00	
#202	20 00	

DIAMOND DIES)
SAWBLADES Prices on request
GLAZIER TOOLS)

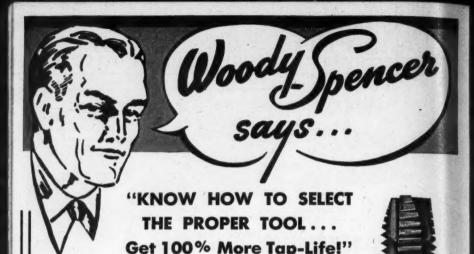
We also carry a stock of unmounted diamonds and will be glad to submit parcels of whatever you require upon request for your examination.

Whether you order or not at the present time, will you please list our name on your card for future inquiries. Thanks.

Cordially yours,

CHAMPION DIAMOND COMPANY

William Schwartz



(No. 2 in a series of WOOD & SPENCER "KNOW HOW" Messages)

Save time, material and labor... choose tools best suited to the job... insure quality results, fewer broken taps and longer tap-life. Remember, every saving in production time, every saving in material brings our Victory closer. To this end, we offer the following suggestions on tap use... apply them to your work; watch the results!

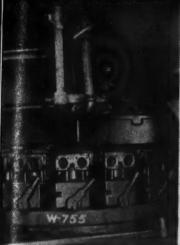
- High-speed steel taps will tap more holes and break more easily at high speeds than at slow.
- When tapping by hand, do not run the tap in a few turns, then back it up. Once started, go forward there is much less chance of tap breakage, and better threads will result.
- In cast iron, high-speed steel taps will do much more work than carbon-steel taps—and do it faster. Highspeed steel taps resist the lapping action much better.
- Be sure blind holes are drilled deep enough so taps cannot strike the bottom, or breakage will result.

Follow these rules—turn out high-quality work faster and with less waste... keep buying War Bonds. It's a combination the Axis can't beat! Write today... tell us your problems.

FROM CUSTOMERS' BLUEPRINTS WE QUITE FREQUENTLY MAKE RECOMMENDATIONS FOR



USE BLANCHARD WHEELS ON BLANCHARD GRINDERS





MATERIAL
Cast Iron
WHEELS
30C40 and 100C
FINISH
5 to 8 Micro inch
LIMITS
.0003" for size
Flat within .00005
PRODUCTION
48 pieces per hour
removing .012"
the finish grinding

Oil Burner Pump Parts Ground on No. 18 Blanchard Surface Grinder.



BLANCHARD CYLINDER WHEE

Blanchard Surface Grinders equipped with Blanchard Grinding Wheels eliminate lapping of parts which require flat surfaces and tight joints.

For example, oil burner parts ground on a No. 18 Blanchard Surface Grinder are rough ground by using Blanchard Wheel 30C40. For finishing after normalizing, Blanchard Wheel 100C15 is used, holding to limits of .0003" for size and flat to .00005".

This is a good example of where the use of Blanchard Wheels results in greater production — finer finish — and elimination of lapping. Reason — Blanchard knows how to fit the wheel to the work.

Blanchard invites you to send samples of your work for their wheel recommendations.



The Booklet "Blanchard Wheels" contains helpful information on the selection of grinding wheels for all kinds of work—sent free on request.



The BLANCHARD MACHINE COMPANY

Compare this NEW SPEED with the Old Way . . .



True-Surfacing . . .

FREEHAND!

with

PORTER-CABLE

Wet-Belt Surfacer

♠ At a well-known bomber plant, the two faces of the aluminum casting shown must be finished at exact right angles, also true flat and glass smooth. With a Porter-Cable Wet-Belt Surfacer these rigorous requirements are met with only one application of each face to the belt and without mounting the piece in a fixture! The entire area is finished at one time; it's unnecessary to take the time to pass a cutting tool over the whole length of surface.



● The belt never "loads" with cuttings. Its flexing action opens the abrasive surface and allows the coolant to wash the grits free and clean, thus insuring sharp, effective cutting. Moreover, the coolant overcomes all possibility of heat discoloration, warping or flowing of the metal.

This amazingly adaptable precision tool replaces or supplements many operations on millers, surface grinders, planers, shapers—relieves them for other work; speeds the entire production flow.

• The Porter-Cable Wet-Belt Surfacer has

been a revelation to many methods engineers and production men. Send for our new booklet, WET-DRY BELT SURFACING, virtually a text-book on this vital new machining process.

PORTER-CABLE MACHINE CO.

300-8 EXCHANGE STREET SYRACUSE, N. Y.

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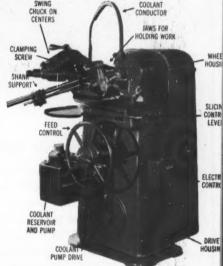
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A New
Operator
Takes Over
on the
Sellers
Drill
Grinder

DELEASING needed manpower for our 7,500,000 Army (and for all the other Services) Girls in Industry are rendering a patriotic service that will not be forgotten. For the production lines of U. S. industry must not slacken... must, in fact, be speeded up, and at the same time all possible manpower must go into our armed forces. Girls in Industry are making this possible... and tools like Sellers Drill Grinders are helping.

Drills are a vital factor in production, and drill grinding therefore is a daily necessity in all large plants. Fast, accurate drill grinding insures clean round drilled holes and prevents production delays. The simplicity of the Sellers Drill Grinder makes it possible for these girls to grind the largest as well as the smallest drills to precision accuracy and with a speed that is astonishing.



WILLIAM SELLERS & CO., INC., 1614 Hamilton St., Phila., Pa.

Sellers



Available for Immediate Delivery

Originally designed for high production work grinding cartridge dies and similar small parts, the ABRASIVE Internal Grinder No. IG offers unusual flexibility and handles a wide variety of production and toolroom grinding jobs. Heavier in weight than most bench-type grinders, the No. IG is exceptionally rugged and accurate. Work spindle, of machine tool construction, mounted on super-precision ball bearings, is carefully sealed against abrasive grit. Diamond wheel dresser assures accuracy of hole size.

Write for descriptive literature illustrating the unusual versatility and range of this machine.

ABRASIVE MACHINE TOOL CO., EAST PROVIDENCE, R. I.



The Wiedemann R-43 has revolutionized the production of accurate templates. No layout is required and there is no die set-up time or costly preparation. The Micro-Turret Press pays almost unbe-lievable dividends in labor saving and speed on accurate piercing of templates.

Get the facts. Write today for a newly published bulletin on the Wiedemann R-43 Micro-Turret Punch Press. All details of operation and construction are thoroughly discussed. A copy will be sent for the asking.



WIEDEMANN MACHINE COMPANY 1821 SEDGLEY AVENUE PHILADELPHIA 32 PENNA.

HERE ARE THE ACTUAL FACTS:

Mild Steel 1/4" x 26" x 341/4".

91 holes pierced over entire material area.

16 different hole sizes from .156" to .687" digmeter (rounds, squares, rectangles, clusters).

Accuracy of hole location + .002"

Total Elapsed Time on Micro-Turret Punch Press-41 Minutes.

Total Elapsed Time on Jig borer: 231/2 hours,

Job produced and times supplied by leading radio equipment manufacturer.

EDEMANN TURRET PUNCH PRESSES &

Tannewith DI-SAWS

have LARGER CAPACITY, saw Easier.

STRAIGHTER

In making inside and outside cuts on dies, tools, jigs, etc., as well as inside and outside filing and polishing, the modern die saw will save upwards of 70 per cent of the time required by ordinary meth-

> ods and reduce costs proportionately. Don't overlook this great opportunity to step up both

production and profits. But be sure to get the machine that gives you the added advantage of EXTRA CAPACITY (a full 24 inches between the blades) and the easier and straighter cutting that naturally follows from the use of larger wheels. Get the complete facts concerning the TANNEWITZ M-24, the most highly developed die saw on the market. Simply write for our DI-SAW Bulletin. Also describes larger DI-SAWS for special applications.

THE TANNEWITZ WORKS, GRAND RAPIDS, MICHIGAN

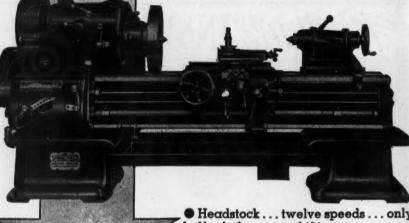


Por Little INSIDE JOBS



BAY STATE ABRASIVE PRODUCTS CO., WESTRORO MOSS U.S. D.

PRINGFIELD PRECISION LATHE Out in front!



SEND TODAY FOR BULLETIN No. 161

Tells the why and how of Springfield's accurate production. Headstock...twelve speeds...only half of the easy-shifting spur gears mesh at one time.

Motors . . . V-belt or silent chain drive. Bed . . . permanently true—made of high test alloy to resist warp or marring undersevere service.

Apron . . . extra heavy—operates on Ball and Bronze bearings throughout.

Taper attachment . . . hair-trigger adjustment.

Compound rest . . . sturdy, firm.

Tailstock . . . all bearings and bed ways oiled from one well.

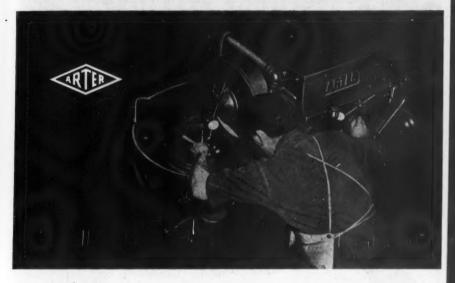
From headstock to tailstock—the SPRINGFIELD Lathe is out in front!

THE SPRINGFIELD MACHINE TOOL CO.

SPRINGFIELD

OHIO, U.S.A.

ARTER



ARTER Rotary Surface Grinder (Model A) ...

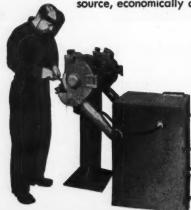
Here is a precision grinding operation on an airplane engine part—a flat surface, a blending fillet and a diameter ground in one chucking. Indicator, mounted on wheel guard, guides the operator in centering, and a shoulder grinding attachment with indicator gives positive, accurate control of size on the diameter.

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS . U. S. A.



Don't allow dust to <u>air raid</u> your plant, menacing employees' health and efficiency, and destroying your valuable machinery. Sound the "All Clear" by installing TORIT Self-Contained, Portable DUST COLLECTORS. They trap dust instantly at the source, economically and efficiently.



NOTE: Silicosis is oftentimes caused by abrasive dusts. Protect your employees from this hazard.

Inquire further about the advantages of Torit Dust Collectors.

TORIT MANUFACTURING COMPANY

298 WALNUT STREET . DEPT. A SAINT PAUL, MINNESOTA

TORIT Dust Collectors



FULFLO COOLANT PUMPS and OIL-RELIEF —BY-PASS VALVES—

FULFLO CENTRIFUGAL COOLANT PUMPS

Motor, direct or belt drives. Pipe sizes 3/8" to 11/2". Right or left rotation. Assure constant flow of coolant.

Select from 75 models or let us design special types for your purpose.



Model AG3M

Motor driven. Hardened steel sleeve shaft slips over motor shaft.



FULFLO OIL-RELIEF BY-PASS VALVES

For maintaining specific pressures without further attention after installation. Particularly important on oil-burning equipment, machine tool hydraulic mechanism, ram presses, etc. Pipe sizes 1/4" to 2". Pressures from 0# to 350#.

Write for catalog and detailed information.





Specialties Co., Inc.

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 - . DRILLING
 - · POLISHING

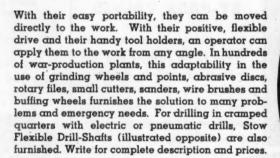
- SANDING
- . BUFFING
- · FILING



STOW

FLEXIBLE-SHAFT
MOBILE POWER UNITS

Whether the job is in the toolroom, machine shop, assembly line or maintenance department—there is the chance for saving manpower, cutting time, lowering costs, with Stow Flexible-Shaft Mobile Power Units.





MANUFACTURING CO.

1 SHEAR ST., BINGHAMTON, N. Y.

The 12" Hy-Draulic SHAPER



Is Back in the Line

War requirements blacked out all information about 12" Hy-Draulic High Speed Shapers during many months. Now the 12" Hy-Draulic Shaper is back in the line. Standing orders take the first lot released for civilian use, war requirements remain urgent. Even so-deliveries can be quoted on 12" Hy-Draulic Shapers ordered now; and we are building all Hy-Draulic Machine Tools as fast as it can be done right.



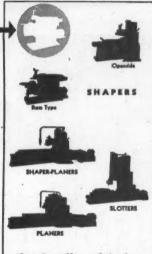
Speed — The 12" Hy-Draulic Shaper gives you new high speed of set-up, strokes-per-minute, easy handling. It is setting new high production records on lots of current war work.



Rasy Operation — Exclusive Hy-Draulic features eliminate hand cranking and use of wrenches in setting ram stroke or position. This adjustment can now be made easily and safely, without stopping the machine. Likewise, any cutting speed or feed rate whatever, in specified wide ranges, can be obtained instantly by light lever movement. Duplicate main controls save time and steps. Universal table, power down-feed to head and other features simplify set-up and operation.



Wide Range—The 12" Hy-Draulic Shaper does so many different jobs so well, so fast and so easily that it is highly productive everywhere on tool, production or maintenance work.



Get Details and Action

The various types of Hy-Draulic Machine Tools are indicated above. Get all the details. Send for illustrated Bulletins describing Hy-Draulic advantages, features, performance

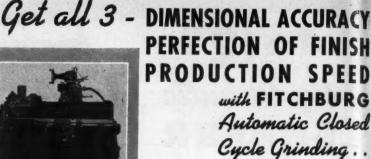
and specifications. Write for your copies, today. On 12" Hydraulic High Speed Shaper, ask for Bulletin 414.



41



ROCKFORD MACHINE TOOL CO.





Here are some of the outstanding features of the Fitchburg Spline Grinder:-



These machines are designed so that new operators can be trained quickly to operate them.

to a maximum of 20 degrees for either righthand or left-hand helical lead angle when helical attachments are furnished.

Wheelhead column may be arranged to swivel

Elevating mechanism is mounted on top of the column for the convenience of the operator.

The headstock may be furnished for either straight, right-hand, or left-hand helical splines.

The index plate is mounted at the left-hand end of the headstock so that it may be removed easily for changing plates. There is a standard 16 key plate which will take care of 2, 3, 4, 6, 8 and 12 spline shafts by inserts in the index notches. Separate index plates are necessary for other spline divisions.

Let Fitchburg engineers show you how to speed production by this modern grinding method.



Write today for this catalog showing wide range of successful operations.



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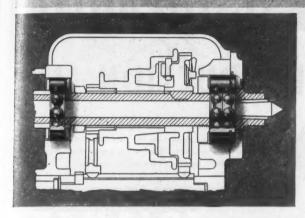
COS

Aug



SUSTAINED Spindle Accuracy!

A FINER FEATURE OF LOGAN LATHES





- Swing over bed 101/2"
- Bed length 431/4"
- Spindle hole 25/32"
- Precision ground ways: 2 prismatic "V" ways: 2 flat ways
- 12 spindle speeds—30 to 1450 # per minute #

Precision, Pre-Loaded Ball Bearing Headstock is Standard Equipment on All Models

To assure sustained spindle accuracy on Logan Lathes, the headstock is equipped with precision, "pre-loaded," New Departure Ball Bearings. This pre-loading prevents cutting tool pressure, either radial or thrust, from causing more than a negligible deflection of the spindle. Being grease sealed, as well as pre-loaded, the bearings require no lubrication or adjustment during their entire life. This special ball bearing equipment permits higher operating lathe speed, enabling the user to take every advantage of modern, high speed cutting methods. Thus, production can be increased and unit costs reduced.

Write for catalog sheets giving complete specifications.





Logan No. 830 5/8" Capacity Hand Screw Machine



Logan No. 850 Manufacturing Turret Lathe

of

r-

OF THE PRODUCTION LINE



August,



- Tools easily honed—kept highly polished—before each shift or with tool in machine—cuts down on carbide-tool grinding.
- Keeping tools sharp saves setup time in changing to new tools, speeds machine output and reduces work spoilage.
- 3 Tamaloy Hones are long-lasting. Diamonds set in tungsten carbide resist wear. Carbide matrix prevents diamonds from falling out when rubbed against hard surface or edge.
- 4. Supplied in three grades rough, medium and fine or 100, 150 and 200 grit.
- ASK FOR PRICES AND OTHER DETAILS

TUNGSTEN ALLOY MEG.

65 COLDEN STREET, NEWARK 4, N. J. formerly Circle Tip Tool Co.



"MATCH THE MACHINE TO THE JOB"

The machine of the hour for total war is the metal-working lathe.

And busiest of the modern, compact lathes is the F-Series Atlas. It's a new victory factor in this war because it lets every production manager "match the machine to the job"— using massive machines full-time on jobs where size and power are really needed with Atlas lathes to take over small-parts production so that capacities of larger machines will not be wasted.

Note the Atlas condensed specifications above. Check them against your small-parts needs with the idea of matching the machine to the job. For complete specifications and the name of the distributor nearest you write Atlas Press Company, 846 North Pitcher Street, Kalamazoo, Michigan.



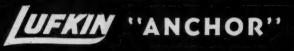




WELDON QUALITY CONTROL

A rigidly maintained policy of 100% inspection has gained for WELDON TOOLS an enviable reputation for quality. From three to five inspection operations are performed on each End Mill. The facilities of the Inspection Department include a temperature controlled "Standards Room" equipped with: Optical Tools and Instruments, Pratt & Whitney Measuring Machine and Super-Micrometers and Master Reference Gages.





CHROME CLAD STEEL TAPE



EASY TO READ MARKINGS THAT ARE DURABLE

A STURDY, PRECISION BUILT QUALITY TAPE

Everyone who appreciates mechanical quality likes the Lufkin "Anchor" Chrome Clad Steel Tape. Suitable for all measuring work, this sturdy tape is available in lengths from 25 to 100 feet and marked in feet, inches and eighths or feet, tenths and hundredths. Case is of finest, genuine mahogany-colored leather, closely hand-stitched over a substantial, steel liner. Folding flush handle opens by a push pin. Write for free catalog.

BUY THROUGH YOUR DISTRIBUTOR



TAPES - RULES - PRECISION TOOLS

MODERN MACHINE SHOP

104

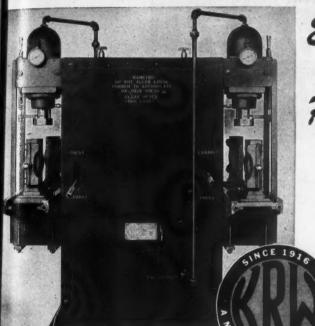
August, 1943

With as a speed for w enging great ment

Prestion 3 tor

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KRW HYDRAULIC ARBOR PRESSES



Engineered for War Production

> Illustration at left shows a special, 4-man operated, airoil press which is used extensively for bomb loading.

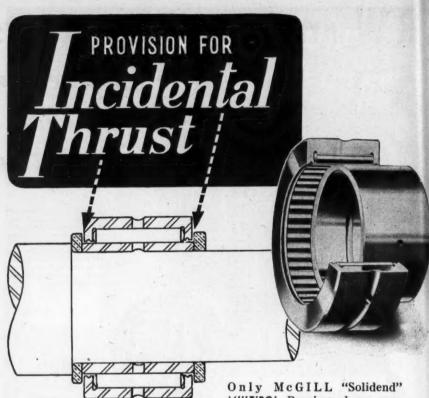
Illustration below shows a special extra high 75-ton KRW Hydraulic Arbor Press in comparison with the standard 25-ton unit.

With standard KRW Hydraulic Arbor Presses as a work-proven basis, we have been able to speedily design and build many special presses for war production—without time-consuming engineering delays. The net result has been a greatly accelerated production of vital equipment which is helping to speed our Victory.

KRW also builds standard Hydraulic Arbor Presses in 25, 50 and 75-ton capacities in addition to bench-type Arbor Presses in 1/2, 1 and 3 ton capacities. If you have a problem that an arbor press might solve, write us.

K. R. WILSON

10 LOCK ST., BUFFALO, N. Y.



MULTIROL Bearings have pro-

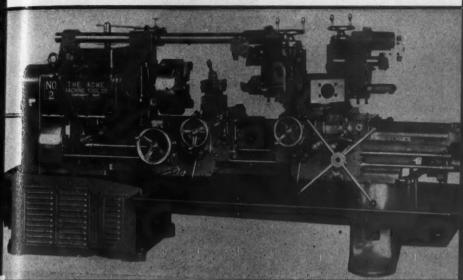
vision for incidental thrust loads. The inner race is made .010 to .015 inch wider than the outer race and roller assembly. Plain bronze thrust washers can be assembled on either side and have a clearance when no thrust load is present. Incidental thrust in either direction is taken up between these bronze washers and face of bearing. No other bearing can be mounted this way.

This is another of the many reasons why McGILL "Solidend" MULTIROL Bearings are proving themselves today's answer to today's needs. Use your Priority to get McGILL "Solidend" Superiority.

BEARING DIVISION - 1500 N. Lafayette St.

MANUFACTURING CO., INC.

For Maintaining Rigidity and Accuracy under Heavier Cuts at Faster Speeds



No. 2 CINCINNATI-ACME Universal Turret Lathe with Heavy Duty Turret Tools

Here's a turret lathe designed to take heavier cuts at faster speed with cemented carbide cutting tools. The new heavy duty turret tools supported by 3" diameter stationary overhead pilot bar are designed to furnish maximum rigidity and accuracy.

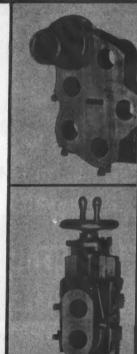
Multiple Turning Head—With reversible cutter holders available for the Multiple Turning Head, the turning range of all 5 holes overlap each other.

Slide Tool—The larger and heavier slide tool has a 6" diameter dial graduated in .001, stop screws and positive binder clamp.

Write for complete details.

THE ACME MACHINE TOOL CO. CINCINNATI OHIO

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Skilled m most crit resources the added and bette workers mer of most

Machin cient becoperate, ble of despeeds a manpower is lost preopardize

Give y more production of the production of the production of the production of the production red ingly shours. Producing Power Power SKILLED MANDOWER MANDOWER

Skilled manpower is one of the most critical of all our strategic resources. To give our fighters he added striking power of more and better weapons, our skilled workers need the producing power of more efficient tools.

Machine tools that are inefficient because they are hard to operate, inaccurate, or incapable of delivering the required speeds are wasteful of critical manpower. Wasted manpowers lost production—and victory eopardized!

Give your skilled manpower nore producing power with South Bend Lathes. Designed and built to deliver maximum production with minimum effort, they are highly efficient on a wide variety of precision machine work. Their ease of operation reduces fatigue and seemngly shortens the workday by hours. This is accomplished

through conveniently placed, smoothly operating controls—clear-cut, easy reading graduations—fully enclosed design with no exposed pulleys, belts, or gears—and dependable precision that permits top speed production, even when tolerances must be held to extremely close limits.



The entire line of South Bend Lathes is described in Catalog 100 C. Write for your copy of this new 48-page catalog.



Buy War Bonds

Small Parts MILLER

WITH ADDED

POWER LONGITUDINAL FEED

BUILT-IN ACCURACY
1 H.P. MOTOR-IN-BASE DRIVE
TIMKEN BEARING SPINDLE

The No. 3 WIGGLESWORTH MILLER produces a fine finish, free from chatter marks on small parts within its range. Particularly adaptable to the manufacture of small arms

parts.

Drive is through a pair of 45° angle spiral gears in the saddle to the worm. The feed gear mechanism consists of a set of planetary gears. Drive to table is taken from a 3-step cone pulley on rear of spindle to a 3-step pulley in feed shaft. Planetary gears provide proper speed reduction to spindle to give proper feed rates to table. Six spindle speeds are obtainable from 150 to 800 r.p.m.

IMMEDIATE DELIVERY
WITH HIGH PRIORITY

Write for complete folder.

WIGGLESWORTH MACHINE TOOL COMPANY

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MODERN MACHINE SHOP

August, 1943

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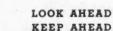


IN a few seconds with the candling process, you can pry out the innermost secrets of an egg!

Almost as quickly, you can "see through" the facts of balance in any rotating part.

The amazing speed and accuracy of Gisholt Dynetric Balancing is achieved with electron tubes through which unbalance vibrations as small as .000025" are clearly recorded on a sensitive meter. Such extreme accuracy is not required in commercial balancing, yet it indicates why Gisholt Dynetrics are pre-eminent in the field for balancing any part from 1 ounce to 50 tons.

GISHOLT MACHINE COMPANY
1219 E. Washington Avenue • Madison, Wisconsin



With Gisholt Improvements



GISHOLT DYNETRIC BALANCING MACHINES are protecting many vital war products against vibration, bearing overloads, and excessive wear. Literature on Dynetric Billaucing is yours for the asking.



The Army-Navy "E" and the Treasury Flag fly side by side at Gisbolt.

TURRET LATHES . AUTOMATIC LATHES . BALANCING MACHINES



PART NUMBERS



MODEL 175

LETTERING

GRADUATIONS

ROLLED

BY MACHINE

ON

FLAT and ROUND SURFACES

Sure - Fast - Accurate

OBSOLETES HAND STAMPING

SAVES PARTS LABOR STAMPS

Eliminates POOR MARKING ERROR — NOISE

Speeds ... DELIVERIES

ALSO ADAPTED TO CERTAIN KNURLING OPERATIONS

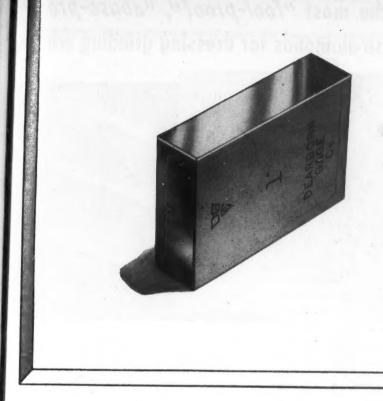
This Hydraulic Machine will mark piece parts quickly and accurately. It is serving in the war effort in many plants for marking components of guns, tanks, planes, motors, engines, shells, and practically every metal part produced for war equipment. Machine will mark unlimited number of sizes and shapes when equipped with proper tools and fixtures. It will also do an excellent knurling job on solids and shells of small diameters.

Designed and Built By

GEO. T. SCHMIDT, INC.

1806 BELLE PLAINE AVENUE

CHICAGO, ILLINOIS



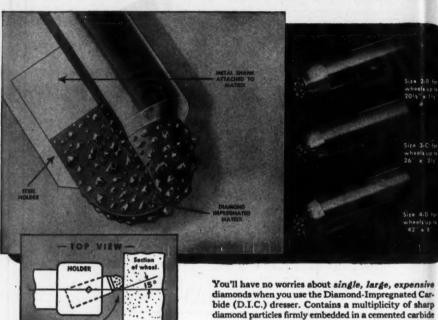
A Picture
of
Accuracy

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DEARBORN GAGE CO. 22032 BEECH STREET DETROIT, MICHIGAN Plated Gage Blocks

Here is the most "fool-proof", "abuse-proof" way to use diamonds for dressing grinding wheels



Easy to Use

Simply place the dresser in a holder, on a 10° to 15° angle and put holder in your standard adaptor. Give dresser a 1/4 turn in holder daily and a new cutting surface is presented to wheel. No remountings necessary!

matrix moulded to shape of each diamond. They can't come loose-can't drop out! Every diamond stays on the job until the last carat of usefulness is consumed.

"D.I.C." dressers save you money and time all along the line. No remountings required—just a 1/4 turn of dresser in holder presents a new cutting surface. No switching to smaller jobs as the dresser wears. You can use it throughout its life on the same job if necessary. No moving parts to repair or replace. Uniform price.

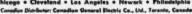
Save at least 25% annually on dresser costs. Write for folder DR-100.

CARBOLOY COMPANY, INC.



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RBOLOY CEMENTED DRESSERS